The Builder.

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New Infirmary, Holloway Sanatorium .....Mr. R. Weir Schultz, Architect.
Station-street Buildings, Huddersfield .....Mr. J. Hatchard Smith, F.R.I.B.A., Architect.
Columbarium for the Borough of Hampstead .....Mr. James J. S. Naylor, A.R.I.B.A., Architect.

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The Development of Iron and Steel Roof Design.—II.

A TYPE of arched roof construction possessing distinct claims to recognition is that illustrated by the roofs of the Agricultural Hall and Olympia. At the time of its erection, in 1862, the Agricultural Hall had one of the largest roof spans in existence. The central arch measures 125 ft. from centre to centre, and the two side arches are connected therewith, so that the whole forms a compound structure transmitting part of the thrust from the main arch through the side spans.

The roof of Olympia, designed by Mr. A. T. Walmisley, as joint engineer with Mr. Max am Ende, is worthy of special note, for the reason that the central span is an arch of greater width and height than is to be found in any other building in the metropolis with the exception of St. Pancras station. The central span measures 179 ft. between the columns, and the manner in which the horizontal thrust of the arch and the horizontal wind pressure are taken up is distinctly novel. The whole of the gallery on each side acts as an abutment, and, as the columns are fitted with ball and socket joints at top and bottom, these members are always under axial load whatever may be the wind pressure on the roof or the irregularity of the loads on the gallery at either side of the building. This roof was described in the *Builder* for 1887, where illustrations and full details of the construction will be found.

Arched roofs of great span like those at St. Pancras and some others which have been mentioned undoubtedly represent the safest form of construction, because their stability does not depend upon a single member, as in the case of trusses whose ends are held together by tension bars. By their adoption large spaces can be covered without intermediate supports, and for this reason such roofs are particularly suitable for large public halls. For railway stations they are far less suitable owing to the unnecessarily heavy cost and to the impossibility of providing in a suitable manner for the lateral extensions which are almost invariably required sooner or later, however large a station may be at the commencement.

To secure unobstructed space in railway stations at the lowest possible cost is a problem that has exercised engineers for many years past. In some of the earlier stations that were built small spans were employed with intermediate supports between the running tracks, the disadvantage of this practice being the obvious danger that the derailment of rolling-stock might displace one or more of the columns, and so bring down a considerable portion of the roof. Accidents of the kind have already occurred, and although the danger may not be very imminent in the case of terminal stations it is far more so at other stations through which trains pass at high speed.

As a compromise some stations have been built with roof spans of moderate width supported by intermediate columns in the middle of the platforms. Two examples of the kind are afforded by Broad-street and Liverpool-street stations.

Broad-street station, built in 1865, has roof principals which may be described as queen-post trusses surmounted by a cast-iron arched spandril ridge. The station includes two roof spans of 95 ft., intermediate support being afforded by cast-iron columns, as represented in Fig. 9. The main rib is built up of wrought-iron structural sections; the tie-bar is of cylindrical section in eight lengths, the ends of which are forged out to form eyes. The struts are secured by pins to lugs on the main rib, and by bolts at the tie-bar, the diagonals being connected by means of pins, and attached to cast-iron fourway sockets at the points of intersection.

Fig. 10 is a diagram representing part of the older portion of Liverpool-street station roof, designed by the late Mr. Edward Wilson. This is an example of cantilever construction with spans of 109 ft. between rows of columns rising from the platforms. The cantilevers are built up solid, and their extremities are connected by lattice girders. The subsequent extensions designed by Mr. John Wilson, the present engineer to the Great Eastern Railway, shows clearly that this method of construction lends itself very readily to enlargements required from time to time.

Another method of applying inter-

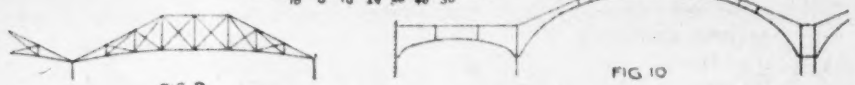


FIG 9

FIG 10

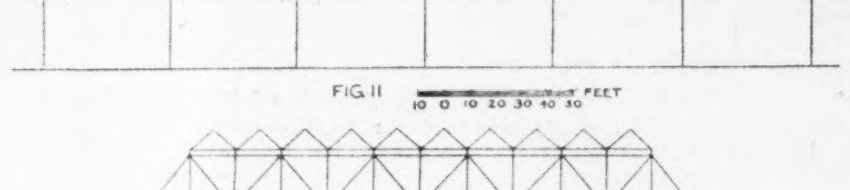


FIG 11

FIG 12

FIG 13

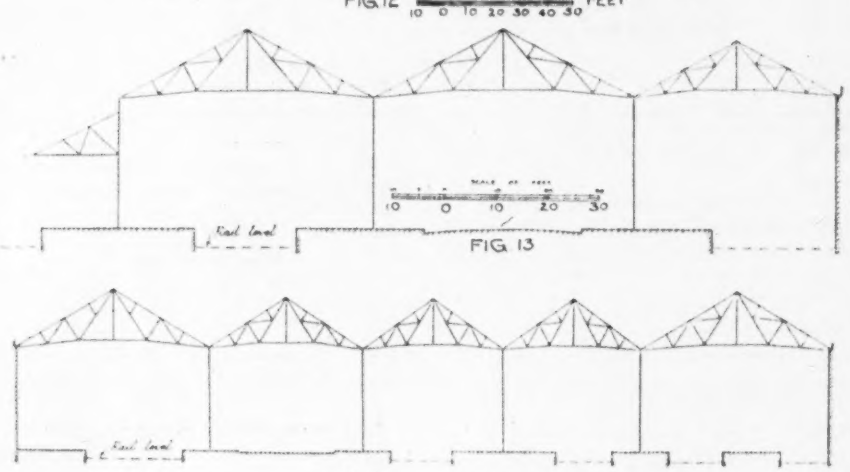


FIG 14

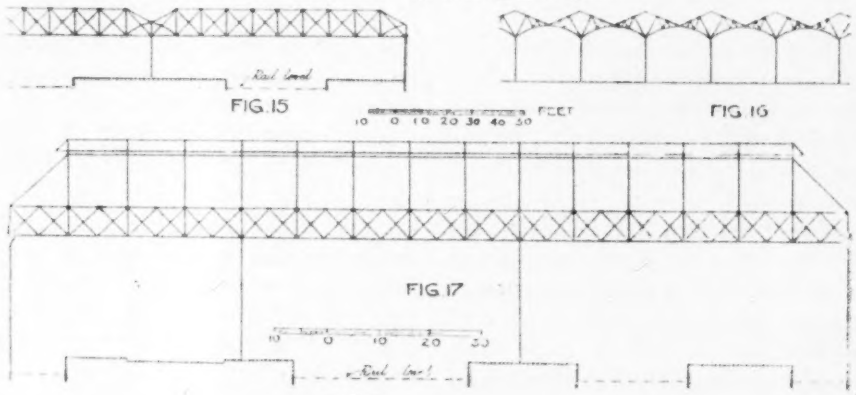


FIG 15

FIG 16

FIG 17

mediate supports for a large railway station is illustrated by the old roof of Victoria station (London, Brighton, and South Coast Railway), designed more than forty years ago by Mr. Jacomb Hood, and now in course of replacement. Here, as shown in Fig. 11, continuous girders extend from one side to the other of the station, each with one intermediate column. These girders are 10 ft. 9 in. deep and form two spans of 124 ft. and 117 ft. respectively, and carry 50 ft. roof trusses of the queen-rod type, as represented in Fig. 11, which is a part longitudinal section. The use of girders in the manner described makes it possible to place supporting columns wherever they may be least inconvenient, and to carry out repairs or renewals at pleasure. Moreover, a station so built can be enlarged without demolishing any portion of the roof.

The Central station in Glasgow is spanned in a somewhat similar manner by seventeen deep latticed girders spanning the whole width from wall to wall, as shown in Fig. 12. The main girders are 213 ft. 6 in. long by 20 ft. deep, and carry ten ridge-and-furrow roofs, of 35-ft. span, the ends of which rest upon the top flange of the main girders, so that the ridges are parallel with the longitudinal axis of the station.

There is a somewhat similar example at Derby, where the principals of the Midland Railway station are connected a little above the bottom flange of transverse girders. This arrangement has the advantage of shielding the greater part of the main girders from the deleterious gases given off by locomotive engines.

Among roofs of recent construction, that of Marylebone station is a good example. The platforms, lines, and promenade are covered with light steel roofing carried by built-up stanchions and arched girders of the Linville type. The total width of the roof is 155 ft., made up, as shown in Fig. 13, of two trussed spans of 50 ft. and 40 ft. respectively and a 15-ft. cantilever span. This roof is of unpretentious character, and, owing to the elegance of its construction and the absence of high walls, the station is one of the most cheerful and best lighted in the metropolis.

The new roof now being built from the designs of Mr. Charles L. Morgan in connexion with the extensive widening operations at Victoria station (London, Brighton, and South Coast Railway), London, is an admirable illustration of sound engineering design, complying alike with the requirements of traffic and the safety of the public. The total width covered, from Buckingham Palace-road to the South-Eastern and Chatham Railway, is about 320 ft., the roof being divided into five spans of varying width and height. The main principals are spaced 16 ft. 8 in. apart; every third principal is carried on one of a series of cast-iron columns, spaced 50 ft. apart; and the others on latticed girders connecting the columns, the latter being arranged along the centre lines of the platforms, where they are safe from accidental injury. A portion of the new roof is illustrated in Fig. 14, the dimensions of the chief members in the roof trusses being as stated below:—The main rafters are formed of two 18 in. by 3 in. channel-bars; the main tie-bar consists of two 6 in. by 3 in. tee-bars in each side length and two 4½ in. by ½ in. flat bars in the centre length; in the bracing the struts consist of channel and angle-bars of different dimensions, single or duplicate according to position; the ties are flat bars of different dimensions, single or duplicate according to positions; and the vertical tie in the centre is a 1¼-in. diameter eye-bar, provided with a screwed turnbuckle for purposes of adjustment.

A design presenting features of decided novelty is that proposed by Mr. A. T. Walmisley for the new Marine station on the Admiralty Pier, Dover. Figs. 15 and 16 represent respectively part transverse and longitudinal sections of the roof. According to the scheme contemplated by the designer the station is to be 800 ft. long by 200 ft. wide, but these dimensions are not yet finally settled. Three rows of cast-iron columns, spaced 26 ft. apart centre to centre, will carry the roof structure, the outer rows each supporting one end of the transverse lattice girders with the span of 100 ft., intended to meet at the centre row of columns placed in the middle of a platform 60 ft. wide. These girders are 10 ft. deep, and are divided by vertical struts into panels 10 ft. wide, having a double system of diagonal ties. The height from rail level to the under side of the girders will be only 20 ft. The columns are continued above the bearings of the girders and incorporated into the ironwork of the double cantilever roof principals, which form 25-ft. spans, and somewhat resemble the cantilevers of the Forth Bridge in outline. The cantilever arms project 12 ft. 6 in., and their ends carry the roof gutters, which discharge through the centre rows of cast-iron columns. It is proposed that the seaward side of each roof ridge shall be covered with sheet copper laid over felt and boarding, and the other side by glazing. Timber has been selected for the purlins instead of iron, owing to its immunity from injury by the steam and gases emitted from locomotives, and for the same reason wrought iron is specified

instead of mild steel for the roofwork generally.

The three foregoing types of design are sufficient to demonstrate the reaction that has set in against roof spans of exceedingly large proportions, and the new roof designed by Mr. P. C. Tempest for Charing Cross will serve to emphasise the same characteristic.

The new covering for this station is shown diagrammatically by the cross section in Fig. 17, being designed on the ridge-and-furrow system, with ridges running at right angles across the station. The principals will be carried by latticed girders extending from side to side of the station, and these girders will be supported by the lowered side walls and by two lines of columns placed in the middle of the platforms. The total height of the roof will not be more than about 35 ft. to 40 ft. above rail level, and, owing to the reduced height of the side walls, abundant provision will be made for the admission of light, to say nothing of the other manifest advantages of the new structure.

The reason for adopting this type of design was that it will be possible to construct the transverse girders in such a way that the columns may be moved within reasonable limits to suit any rearrangement of the platforms that may become necessary, and thus to save any alteration to the structure of the roof in case widenings should be undertaken on either side of the present station. At the same time the new roof will conduce to the safety of the public, give increased facilities for maintenance, and provide for the ready escape of steam and gases.

The development of iron and steel roof design on a large scale forms a most interesting study, which is naturally too extensive for adequate treatment in an article such as this. Those who wish to pursue it further will find abundant material in the *Proceedings* of the Institution of Civil Engineers and in the pages of various engineering publications, but for readers who have not an extensive library at command the most convenient source of information is Mr. Walmisley's well-known work on iron roofs, which describes and illustrates many such structures erected up to the year 1887, and from which we have prepared the diagrams of some of the earlier roofs mentioned in this article.

The most recent examples of construction serve to demonstrate the fact that the monumental roof is no longer thought to be a necessary feature. It is certain that the railway station of the future will be of far less pretentious character than heretofore, and at the same time less costly and better adapted to its intended purpose.

It seems probable, in fact, that the desire to reduce initial expenditure, to avoid the unnecessary risks attached to large spans of certain types, and the great cost of maintaining those of other types, and to obtain facilities for extensions required from time to time, will finally lead railway companies back to the practice of simply covering the platforms of their stations, leaving open spaces between the lines for the free escape of steam and smoke and for the ready admission of light and fresh air.

In justice to the designers of railway-station roofs, it must be pointed out that the fashion for ostentatious spans did not originate with them, but with traffic managers, who thought it desirable that the whole interior area should be absolutely unimpeded by column or interior supports. Fifty years of experience have served to dispel this notion, and we are now on the point of returning to the less ambitious ideal which possessed engineers in the early days of the railway system.

Important public buildings, of course, stand upon another footing, and naturally must be covered in a manner dictated by architectural requirements and the purposes to which they are destined.

NOTES.

Peaceable Persuasion.

A CORRESPONDENT of some influence has raised the question in the *Times*, "Is peaceable persuasion legal now?" The question has arisen out of an article contributed to the *Times* by Lord Lindley, in which the following passage occurs:—

> "There is no law against peaceable persuasion or attempts to peaceably persuade—provided that the person persuading does not force himself on those whom he may address, and provided there is no recourse to threats of violence and no annoyance so serious as to amount to an actionable nuisance."

The correspondent in the *Times* finds the case of Charnock *v.* Court, decided by a Chancery judge in 1899, inconsistent with the statement of Lord Lindley. The facts in Charnock *v.* Court were that, a strike amongst journeymen carpenters being in progress at Halifax, the masters imported labour from Belfast. Two members representing the trade union were sent to Fleetwood to await the arrival of the steamer conveying the men who were under contract to work as non-union men for the employers at Halifax. These delegates, when the men arrived at Fleetwood, offered the men their expenses, also work, and in some cases a night's lodging, if they would go elsewhere and break their contract to proceed to Halifax and work there. The Court held that, under the Conspiracy and Protection of Property Act, sect. 7, the delegates were watching and besetting the place where the men happened to be with a view to compelling the masters to abstain from doing what they had a legal right to do, and that they were not there merely to obtain or communicate information, but to induce the men to go elsewhere. The writer of the letter to the *Times* asks someone to inform him how this case is reconcilable with Lord Lindley's statement, and the answer is not hard to give. It must be remembered that "peaceable persuasion" is a colloquial expression not found in the Act. Watching and besetting "with a view to compel any person to abstain from doing or to do any act which such other person has a legal right to do or abstain from doing" is the offence under the Act, the exception being "attending . . . merely to obtain or communicate information." In the above case there was watching and besetting for a prohibited purpose, and the object of the watching and besetting was to offer a pecuniary inducement to the men to break their contract, not to merely communicate information. We may quote from the Majority Report of the Royal Commission on Trade Disputes in support of our argument as set out above. The Report says, "No man has ever been punished under this Act for merely peacefully persuading. What he has been punished for is watching or besetting a house, etc., with the view of peacefully persuading—a different matter."

Report of Public Control Committee.

THE Report of the Public Control Committee of the London County Council contains statistics of general interest on many subjects, but only a few will appeal especially to our readers. It is interesting to note that accidents due to petroleum lamps are of less frequency than of late years. During the year ending March 31 only 116 lamp accidents were the subject of investigation, whereas in 1890 we find in the tables appended that there were no less than 1,548 such cases. The principal cause of such accidents appears to be upsetting of lamps, and therefore the Report contains a recommendation that strong metal reservoirs are essential to safety. Another subject of interest is smoke abatement. The County Council, under the Public Health (London) Act, 1891, can only act in default of action being taken by the Borough Councils, and during the year no case of persistent serious nuisance has occurred such as to cause the Council to act. The Report advises greater simplicity in procedure and also an amendment of sect. 24 (*b*) of the Act by the omission of the word "black" before the word "smoke," a qualification which prevents efficient measures to deal with some smoke nuisance being taken. The above enactment does not apply to private houses, and over these there is no control. The Report points out that in private houses much can be done in diminishing smoke by the use of modern grates, but that the majority of grates in use produce a minimum amount of heat with a maximum amount of smoke. Now that London covers such a vast area it is to be feared little can be done in improving the atmosphere by proceedings against public companies and commercial undertakings so long as millions of private chimneys taint the air with their smoke. Against railway companies penalties were recovered in 135 cases, but in other instances notification to the companies sufficed.

Official Architecture.

THERE seems to have been a demonstration made by some of the architects of Bradford, at a meeting held last week, against an official statement issued by the Bradford Corporation intended to show that a considerable saving had been effected by the establishment, five years ago, of the City Architect's Department, and the consequent carrying out of much architectural work by him instead of by architects in private practice. There is something more about the matter than we can gather from the report in the *Yorkshire Daily Observer*, as we notice that none of the architects whose names are mentioned as attending the meeting are members of the Institute, with the exception of one Associate (Mr. A. R. Hill); and it is mentioned that the Bradford Society of Architects had issued

a circular to its members asking them not to attend the meeting. There must have been reasons for this which are not within our knowledge; as to the general principle we think the objectors were in the right. The chairman of the meeting (Mr. T. C. Hope) said that they had a beautiful art gallery in the Cartwright Memorial Hall, but with a great deal of bare wall to cover; "was there any man in the Town Hall who would dare to suggest that we should create a picture department, and engage a municipalised painter who, with his assistants, should cover those bare walls with paintings?" If we are to regard architecture as an art and not as a mere ratepayer's business, the parallel is perfectly logical, and we agree with the speaker's position. Another borough, East Ham, seems also to regard public buildings only as a business, as we see that the Town Council Engineer has submitted a draft sketch of a plan and elevation for the Carnegie library there, which have been approved. That may save the ratepayers' money, but it is not the way to get the best architecture.

Specifying Special Firms.

In a letter in our "Builders' and Contractors' Column" in this issue, "A London Builder" recites the objections of himself and (we gather) of builders and contractors generally to the action of architects in specifying that certain articles should be supplied by special firms. For the objections we may refer our readers to the letter; but we may remark here that an architect may have a very good reason for specifying the supply of work by a special firm; he knows the work of that firm, and knows that he will get what he wants from them. On one point, however, we are in agreement with "A London Builder"; we think the general contractor has a ground of complaint if arrangements are made with a special firm of which he has no cognisance; it is putting him in a false position. But as to the argument that things will be got cheaper if the builder is at liberty to obtain prices from a number of firms, and that "keener competition and consequently lower prices" are "a benefit to all concerned," we dissent from it utterly. It is keen competition and fine cutting of prices which is at the bottom of half the bad work that is done, and is a crying evil of the day rather than a state of things to be specially promoted.

The Grantham Disaster.

In some respects the causes leading to the wreck of the Scotch express just beyond Grantham station were similar to those responsible for the Salisbury accident. The train was travelling at a speed far too high for the curve on which it entered. It commenced to rock, dashed into the parapet wall of a bridge, and broke into three sections—the engine overturning on the line, the front carriages rolling down a steep embankment, and the rear carriages remaining in a perilous position at the edge of the slope. At Salisbury, excessive speed on the proper road for the train was the cause of the derailment. At Grantham, the disaster was due to the non-stoppage of the express at the station, so that while travelling at high speed it entered a short and sharp curve which is not safe for speeds of more than fifteen miles an hour. This curve is on the Nottingham branch, where the points were set open to let a train in and would have been closed before the departure of the North express. Whether the practice of working the points thus was a wise one is doubtless a matter that will receive consideration by the Board of Trade and the Great Northern directors. That their position contributed to the accident is certain, but in justice to the company it should be remembered that the continued progress of a train despite adverse signals and running orders is a contingency that could scarcely have been anticipated. In other respects no precaution seems to have been neglected by the railway company. The signals were against the train, the brakes were in perfect order, and so also was the engine. It is now generally agreed by those best qualified to judge that steam had been shut off before the train passed through the station, but, at the same time, that the brakes were not applied until the train was close to the south end of the platform. Even then, if circumstances had been favourable and the speed a little less, the train might have been pulled up before the fatal curve was reached. As it turned out the line was greasy owing to drizzling rain, the brakes were put on too suddenly, and the last hope was gone. The driver was one of the most trustworthy in the company's service. Whether he was trying to cut things too fine, or forgot all about the brakes until it was too late and then applied them suddenly in desperation, or temporarily lost his head, are questions which can never be answered.

Too Many Officials.

Most legislation having for its object the amelioration of the lot of the workers of any country, especially when designed to increase their personal safety, tends to swell the ever-increasing army of officials. New laws and fresh safeguards inevitably mean more inspectors and other officials. The builder and contractor is surrounded by them—locally appointed and imperial—and the measures advocated by his employees and their Parliamentary representatives frequently tend to add to the number. That many of the appeals made to the Board of Trade by railwaymen have this tendency is undoubted, but at a recent meeting in support of the agitation for shorter hours for railway servants, a singular remark was made by one of the speakers (Mr. R. Bell, M.P.). After observing that he considered the railways over-officialised, he said that there were "too many subordinate inspectors in this country—men who were hiding behind hedges, behind bridges, watching the men going on with their work. It was not conducive to the safety of the travelling public when men knew that they were being watched, harassed, and worried in that way, and it might be responsible for some mental aberration." In view of the recent fatality, the inference is obvious; but, for the conscientious worker, lurking officials should have no more terrors than police-traps have for the law-abiding motorist. Sympathising as we do with any endeavour to secure a reduction of excessive working hours, we may express a hope that Mr. Bell's fears are considerably exaggerated, and that this is not regarded as one of the leading arguments in the present movement. Board of Trade requirements, not less than considerations of economy, compel increasing supervision, but in the remarks quoted the speaker evidently had in mind the latter incentive only. "The safety of the travelling public" should be the first concern of railway officials and directors; and, while neither the Board of Trade nor the travelling public themselves will permit this to be lost sight of for a moment, the penalty attaching to neglect or indifference constitutes in itself an additional security.

Flammable Railway Carriages.

Almost every fresh railway accident emphasises the desirability of stringent regulations for the prevention of fires in vehicles which as at present constructed are veritable death-traps. We have repeatedly pointed out the necessity for reform, and it is to be hoped that railway companies will soon cease from building passenger carriages of readily ignitable and combustible materials, and also that—by those who have not already done so—electricity will at once be substituted for gas as a material of illumination. The calamity at Grantham showed with dramatic effect the dangerous character of timber carriages, ready to burst into flame by contact with hot ashes or ignited gas; and it may be added that the use of gas instead of electric light greatly increases the probability of fire. Various eye-witnesses of the scene after the accident agree as to the rapidity with which the wrecked carriages were enveloped in flames. Scarcely a minute elapsed before the train was ablaze, the carriages burned furiously, lighting up the whole neighbourhood, and so fierce was the fire that rescuers were unable to aid hapless passengers pinned beneath the wreck. Water from the hose seemed to have no effect, and portions of the train were still blazing two hours after the accident. That railway companies should continue to favour combustible instead of fire-resisting carriage construction is most regrettable, but we fear there is little probability of reform until the Board of of Trade, or Parliament, if necessary, take up the question in earnest.

Acquisition of Tramways.

At a time when tramway companies are being compelled to part with their undertakings to local authorities the decision of the House of Lords in the case of Manchester Carriage and Tramway Company *v.* Swinton and Pendlebury Urban District Council should be noted. The Tramways Act, 1870, by sect. 43 provides that the local authority can acquire these undertakings "or so much of the same as is within such district," and all "lands, buildings, works, materials, and plant of the promoters suitable to and used by them for the purposes of their undertaking within such district." The tramway company in question had two depôts about a mile outside the district of the urban district council. As to one the arbitrator found that it was not "suitable to such undertaking," whilst as to the other he found

that it was used with and suitable to the undertaking. It was contended that the latter depôt should not have been included in the award because it was outside the district of the local authority. The finding of the House of Lords amounts to this, that the words "within the district" apply only to the undertaking itself, not to the lands, buildings, etc., suitable to and used with it, and that when the arbitrator had found as a fact the questions of the use and suitability of the buildings for the purposes of the undertaking, they were rightly included in the award although outside the district.

The Latest "Skyscraper."

A STRIKING feature of the extension to the Singer building at the corner of Liberty-street and Broadway, New York, will be a tower containing forty-one stories, and rising to the height of 612 ft. above street level. Although only to measure about 63 ft. square, this structure will provide a floor area of 9·5 acres, which, with one exception, is greater than that of any other building in the city. From the structural standpoint the tower is of much interest, the most notable characteristic being the method of framing the steel skeleton to enable it to resist the enormous wind pressure against the sides of the building. The tower is also interesting for the reason that, while providing admirably for engineering requirements, it has been designed with due regard to architectural effect, a fact on which the architect and the engineers are to be congratulated. Briefly described, the structural idea is the association of four corner towers with a central tower containing the lift well, each tower having diagonal wind bracing running through the walls from base to summit, and all five being tied together in lateral planes at the various floors. The corner towers are about 12 ft. square, and between them is a recessed panel on each face extending to the capital, which is surmounted by a domed roof. The wind pressure was assumed at 30 lb. per square foot uniformly distributed over the face of the building, and the total overturning moment is calculated at 128,000 foot-tons. It will readily be gathered that the task of providing satisfactorily for the stability of the structure and of guarding against swaying in windy weather has involved constructional problems of no mean order.

Old and New Stanford Bridge.

BUILT in 1797, about eighteen years after the historic structure which gave its name to the town of Ironbridge, the cast-iron bridge crossing the River Teine at Stanford, in Worcestershire, deserved preservation as an interesting example of early engineering. No sentiment of this kind actuated the Worcestershire County Council when it was found necessary a year or so back to make more adequate provision for the passage of steam rollers and traction engines across the river. The Highways and Bridges Committee simply referred the question of repair or reconstruction to their consulting engineers, by whom it was recommended that the old bridge should be replaced by a new one in concrete-steel. In these days, when county and other councils have little compunction in spending money upon many things that are not strictly necessary, the Worcestershire County Council would not have been blamed if they had decided to leave their historic bridge untouched and to find a place in its vicinity for the new work. If such a course had been adopted we should have had side by side two examples representing respectively the first and last new materials applied by modern engineers to bridge construction. The new bridge in itself is an elegant work, crossing the river in a single span of 98 ft. 6 in., and consisting of three arch ribs connected by transverse walls and open spandrils supporting the roadway. It is noteworthy as the largest span concrete-steel arch hitherto built in this country, although its dimensions have been considerably exceeded in similar structures in other parts of the world.

Dr. Johnson's House, Lichfield.

PROPOSALS are made for a restoration, upon conservative principles, of Dr. Johnson's birthplace. The house was built by his father, Michael Johnson, upon land belonging to the Corporation in the Market-square, at the corner of Sadler-street and Women's Cheaping; on July 13 1708, the Corporation agreed to grant him a lease of the encroachment of the property, for forty years, at a rent of 2s. 6d. per annum. After Michael Johnson's death in 1731 his widow carried on his business as a bookseller until shortly before her death in 1759. Upon the expiration of a second lease in 1767 the bailiffs and citizens resolved that it should be renewed to Dr. Johnson for a further term of ninety years, at the old rent, and without the payment of any fine. In the codicil to his will, executed four days before his death, Dr. Johnson devised the house and its appurtenances to his executors, in trust, for sale and disposal in favour of some relatives named in the codicil. In the first volume of Croker's edition (1848) of the Life by Boswell is an engraving by E. Finden, after a drawing by Clarkson Stanfield, R.A., of the house. In June, 1900, Alderman John Gilbert, of Lichfield, presented to the City Council a sum of 250*l*., being the amount of the purchase-money, and a free conveyance of the property, the Council covenanting that the premises should neither be pulled down nor, indeed, be materially altered. The house had been offered to the Council for the nominal sum mentioned as part of the estate of the late Mr. J. H. Johnson, of Southport and Silverdale, who had bought it for 800*l*. in 1887, and re-instated the building to what it was when it formed Johnson's home. It was lately opened as a Johnsonian Library and Museum. The title-deeds bear the signatures of Michael and Samuel Johnson and of Sir Joshua Reynolds, Sir John Hawkins, and Dr. William Scott (Lord Stowell), who were Dr. Johnson's executors.

The Auld Brig of Ayr.

AT a meeting held at Ayr, on Tuesday, in support of the scheme for preserving the "Auld Brig" at Ayr, Lord Rosebery made one of his best and most eloquent speeches in favour of keeping old monuments such as this. Of course his advocacy of the cause was largely in relation to the association of the bridge with Burns's poems; but he made a general appeal also in regard to the historic interest of old monuments, though he admitted that they must be considered on their merits and in relation to modern requirements. But he is probably right in saying that if the old London bridge with the houses on it had survived to the present day, we should not now have the heart to pull it down; if it were inconvenient, we should build a new bridge alongside of it. But the metamorphosis has been gradual, and was commenced at a time when archæology counted for little. Ayr bridge has lasted up to the present day as it has been for many generations, nor does it conflict with any modern convenience; "it is an excellent bridge for pedestrians," said Lord Rosebery; "I tested it myself to-day and it carried me quite safely." That the bridge should have "carried safely" so genial a personality and so eloquent a speaker, whom we could ill afford to lose, is another point in its favour; and at all events we have no doubt that Lord Rosebery's advocacy has assisted the cause.

NOTES ON MOSAIC AND MARBLE INLAY.—II.

AT the monastery at Sinai are some mosaics of the VIth century. In the apse is a Transfiguration, and round the soffit of the arch are busts in medallions, and at Parenzo, in Istria, are important remains of mosaics of the same century, which are curiously like those at Ravenna, especially those at S. Vitale. The cathedral was consecrated about 535. The apse, vault, and a portion of the wall are covered with mosaic above a dado of *opus sectile*, as well as the external face of the triumphal arch, and there are some remains on the west façade of the church above the narthex. The ground of the vault is gold, and on it are strewn clouds of crimson and blue. In the centre are the Virgin and Child attended by an angel on each side, beyond whom are three large figures. On the left "Claudius," then "Ephrasius" (the founder), with a small figure of his son, and then "Maurus" holding a jewelled urn. On the other side are three figures without names; one has a book, and the other two bear crowns. The bishop holds his church, a three-aisled basilica with one apse. The Christ Child is in white and gold, blesses with the right hand and holds a scroll in the other; the Virgin has a dark cloak and a white dress with golden embroidery; above her head a hand emerges from clouds holding a jewelled crown. On the wall below is an angel, with orb and jewelled wreath with ribbons fluttering. On the pier to the right is a saint with a casket in his hand. Another on the left has been much restored with paint. Beyond the windows, towards the nave, are the Annunciation and the Salutation. On the soffit of the arch are medallions with busts of twelve female saints, and at the summit a painted monogram of Christ. Sig. Natale Tōmmasi, who was in charge of the restorations in 1874, discovered other mosaics beneath later plastering on the triumphal arch. In the centre Christ is seated on the globe wrapped in a purple mantle and with a cruciferous nimbus. He blesses with one hand and with the other holds a book open on which is inscribed, "Ego sum lux vera." At each side of Him are six apostles in white tunics and pallia ornamented with crosses and letters; they hold books, scrolls, or crowns; S. Peter has the keys. The lower parts of the figures were much damaged. The ground was of gold with black inscriptions. He also found beneath the painted monogram, at the summit of the arch, a lamb with cruciferous nimbus on a blue ground starred with gold

in mosaic. The façade has three round arched windows, between which are the seven lighted candlesticks of the Apocalypse in mosaic. Outside of them are remains of a few figures clothed in white. The buttresses at each end have also been decorated with a pattern in mosaic.

The church of SS. Cosmo and Damian, Rome, was built by Felix IV. (526-30), on the site of a pagan temple, of which the circular *cella* has been preserved. The mosaics covered the upper part of the arch and the tympana as well as the vault of the apse. The ends of the arch were destroyed when the church was modernised. The subject is one of the visions of the Apocalypse. The Lamb is on a throne, and surrounded by a nimbus above the centre of the arch; at His sides are the seven golden candlesticks; then come two angels on each side and the symbols of S. John and S. Matthew; the angel and the eagle emerge from among the clouds. The subject was completed by the symbols of the other two evangelists and the twenty-four elders, as is shown by two arms supporting a crown at each lower extremity of the arch. The apse has large figures on a blue ground. In the centre Christ stands in front of clouds, blessing SS. Peter and Paul, who present SS. Cosmo and Damian, the Median doctors, to Him. They hold crowns of martyrdom in their hands. S. Theodore and S. Felix the Pope are at the two extremities. The portrait of Felix has a curious history. In the XVIth century, under Gregory XIII., it was replaced by a painted face of Gregory the Great. Alexander VII. restored the head of S. Felix in mosaic, but it is in the style of the second half of the XVIIth century. Below is a strip upon which is represented a nimbed lamb on a golden hill, from which the four streams of Paradise flow, flanked by the twelve apostles in the form of sheep. Jerusalem and Bethlehem are behind them. The figures are all front face, Christ on a higher plane and much larger than the apostles, who themselves are taller than Cosmo and Damian. He has long waving hair, and is bearded, as are the other figures. The draperies are Roman; the figures are athletic and not ascetic except in the heads, which have harsh features. Christ and the angels have nimbi, and so has S. Matthew's symbol. Two palm-trees complete the composition, one at each side; a phœnix, with rays springing from its head, flies in the vault above Christ's extended hand; the summit of the vault has a sun surrounded by clouds. Here the tesseræ are placed roughly on the wall for the first time, almost as if thrown upon it, and are no longer small and square. S. Lorenzo fuori was rebuilt by Pelagius II. (577-90). The mosaic on the arch now facing the altar (for Honorius II. extended the church westward and reversed entrance and apse) is of his time. Here Christ is seated on the globe, blessing and holding a pastoral staff with a cross at the top. On his right are SS. Paul, Stephen, and Hippolytus; on his left SS. Peter, Laurence, and Pelagius. Behind are Jerusalem and Bethlehem. A garland of flowers and fruits tied by a riband fills the soffit, at the summit of which is the monogram of Christ. The nimbus of Christ is cruciferous, and all the figures have nimbi. This mosaic has been much restored; the heads of S. Hippolytus and Pope Pelagius and the figure of S. Laurence are better than the rest. The last is clothed in cloth of gold with purple folds, richly as becomes a Roman archdeacon.

The figure of S. Sebastian above a side altar in S. Pietro in Vincoli is of this century, placed there after the plague of 680. The mosaic shows an old man with a long beard and white hair. He wears a chlamys brooched on his right shoulder, and carries a martyr's crown in his hand. The costume is that of a noble of Constantinople; his legs are clothed and his feet shod.

S. Apollinare in Classe, Ravenna, was consecrated May 12, 549, by Maximianus, but the extant mosaics are dated 671 and 677. The subjects on the wall of the apse are the Sacrifices of Abel and of Abraham, and Melchizedec offering Abraham bread and wine, and, opposite, Archbishop Reparatus receiving from the Emperors Constantine IV., Heraclius, and Tiberius a roll on which is inscribed "Privilegia," the exemption of Ravenna from papal jurisdiction. He made the voyage to Constantinople to obtain the charter in 662. (On the tomb of Archbishop Maurus, however, is the inscription: "He freed his church from the Roman servitude.") There are also lifelike figures of four archbishops—Ursicinus, S. Ursus, S. Severus, and Ecclesius. On the jamb of the window are figures of S. Michael and another archangel holding a standard on which is inscribed ΑΓΙΟΣ, ΑΓΙΟΣ, ΑΓΙΟΣ, and wearing the Greek chlamys, adorned with golden patches of pattern. Above in the vault is a large cross with gilded stars on a blue ground with the Transfiguration; at the sides, Moses and Elias, with S. Apollinaris preaching to his flock below. On the face of the arch is a bust of Christ in the centre, at the sides the figures of the evangelists, and below them twelve sheep hastening from the towns of Jerusalem and Bethlehem to Christ. Silver tesseræ are used in the ornaments, a mark of Eastern influence.

The basilica of S. Agnese on the Via Nomentana was rebuilt and ornamented with mosaic by Honorius I. (626-38). The vault of the apse contains figures on a gold ground, S. Agnes standing in the centre holding in her hands the book of truth, clothed in a rich Byzantine costume, and crowned with a jewelled diadem. At her feet are flames and a sword, and on her head the hand of God places the crown of martyrdom. On one side stands Honorius holding the basilica, and on the other another pope, Symmachus, with a book. A cross forms the central point of a rich garland of fruits and flowers which frames the composition. Above is a long inscription in gold letters upon a blue ground. The oratory of Venantius at the Baptistery of S. John Lateran was decorated with mosaic by John IV. (639-42). The evangelists' symbols are at the top of the arch of the tribune, two and two, in square panels with panels between, and Jerusalem and Bethlehem in longer panels at the ends, and four saints on each side below. The vault shows a bust of Christ surrounded by angels amid clouds; below is the Virgin in prayer flanked by SS. Peter and Paul. There are two more saints on each side, and then John, bearing a model of the oratory, and his successor, Theodore. All of them have the nimbus. The mosaics of the vault are inferior to those on the arch. At S. Stefano Rotondo is a vault above an altar dedicated to SS. Primus and Felician, whose bodies were transferred hither by Theodosius I. (642-9), which has decorations in mosaic. There are figures of the two saints; in the centre above them is a hand which holds the crown of martyrdom (or perhaps the hand of the Eternal blessing His Son); below is a bust of Christ and a great gemmed cross which descends to the flower-besprinkled earth. The Byzantine type is seen in the heads, the tesseræ of which are not square but cut in shapes, and so closely fitted together that the beard of S. Primus looks almost as if painted with coarse brush-marks. The colours are much gradated.

In the sacristy of S. Maria in Cosmedin are some fragments from the oratory of the Virgin in the ancient basilica of S. Peter, which was erected by John VII. (705-8)—the Virgin, S. Joseph, and an angel, and an arm bearing a vase, part of the Adoration of the Magi. Other fragments are in the crypt of S. Peter's (a figure of the Virgin, one of S. Peter preaching, and the portrait of John VII.), in the Lateran Museum (fragments of the Nativity and the Healing of the Blind Man), in a monastery at Orte (a head of a Madonna), and above a side altar in the church of S. Mark, Florence, is a figure of the Virgin. She stands praying in the Byzantine manner, and is clothed like an Eastern empress. The head has a circular aureole, and bears a jewelled crown; her girdle is studded with precious stones, and her robe decorated with embroidery and pearls. Its colour is a brownish red purple, like the dress of Christ in the VIth-century mosaics at Ravenna, where He is shown as a ruler on a throne. The mosaic is Greek in style but less hard; the cubes are hammer-cut and mixed of vitreous paste and natural stones. There are only three tones in the drapery, and the carnations are not modelled. The oratory was situated inside the basilica near the internal angle of the portico, where, on the occasion of the jubilee, in 1300, an opening was made called the "Porta Santa." After that the figure of the Virgin was above this door. The original scheme was in two sections; the first had seven compartments showing subjects from the lives of the Virgin and Our Lord. In the midst of them was the Virgin, and by her side, but smaller, was Pope John VII., with a square nimbus and a little building in his hand. On the golden field was an inscription: "Beatus dei Genetricis servus Joannes indignus Episcopus fecit." Two columns in mosaic bounded the subject. The lower subject, a Virgin and Child, was taken away when the "Porta Santa" was opened, and the mosaics were dispersed in 1606, when that part of the basilica was demolished. The tesseræ are set at angles so as to break up the light in all these fragments. At S. Teodoro, Rome, which was erected by Adrian I. (772-95) on the ruins of a Temple of Vesta, thought to have been the place where the Palladium was guarded, there is a hemispherical vault behind the altar, with the hand of God holding a crown above the head of Christ, Who is seated on a globe and blessing. At one side S. Paul presents a young man, who stretches forward his two hands, which hold a crown placed on some rich stuff. On the other S. Peter presents S. Theodore, who also extends the crown of oblation. Christ and the apostles have naked feet and sandals, the others have hose and shoes. This has been so much restored as to be practically new. The triclinium of the Lateran was decorated with mosaics under Leo III. (795-816). The arch and apsidal vault beneath it were moved to the Piazza S. Giovanni in Laterano between 1740 and 1758 under Clement VII. There are two groups on the sides of the arch of great historical interest, though the mosaics no longer show any of the original work, owing to several restorations. On the left, Christ, seated, holds two keys and a standard surmounted by a cross; kneeling figures of Pope Sylvester and the Emperor Constantine complete the group. On the right, S. Peter is shown giving the *pallium* to Pope Leo III. and the Emperor Charlemagne with a standard. In the vault below Christ appears to the eleven apostles after the resurrection, standing on a little hill with four streams issuing from it, and blessing. S. Peter carries a key and a long cross; the others have their hands hidden in their cloaks. The general design may be assumed to have been preserved, though the character has disappeared. Some fragments of the original (or of the later copy of it) are preserved in the Lateran Museum. The only French example, at Germigny-des-Prés, is of this period.

The Iconoclastic Edict of Leo the Isaurian, issued in 726, and confirmed by the Council of Constantinople in 754 (which was attended by 338 bishops), must have had the effect of driving sculptors and mosaic-workers to Italy from the East, and thus increasing the already strong Byzantine influence which is observable in Rome. The Council of Nicæa, in 787 (attended by 350 bishops), on the other hand, declared that the veneration of images is conformable to the Scriptures, and placed mosaics specially under the protection of the Church; yet the line of Iconoclast Emperors only expired in 842 at the death of Theophilus. Notwithstanding the influx of Greek workmen, the Italian and Roman mosaics of the IXth century still remaining are more numerous than admirable. Leo III. rebuilt SS. Nereus and Achilleus, and of his mosaics a Transfiguration and an Annunciation remain on the triumphal arch with a Madonna and Child. The ground is dark and cloud-besprinkled; Christ appears in the centre in a blue aureole; SS. Peter, Paul, and James are prostrate along the arch; between them and Christ are Moses and Elias. The whole is bordered with a waving line and a gemmed exterior border, and is much restored

Paschal I. (817-24), rebuilt S. Maria della Navicella or in Domnica, and the mosaics remain on the upper part of the arch and the vault of the apse. A seated Virgin and Child, with Paschal kneeling and groups of angels on either side, occupy the vault; the Virgin here for the first time occupies the throne in place of Christ. Above the arch is Christ seated in an oval glory with an angel on each side and six apostles behind, all standing. The perspective of a crowd behind the angels is given by bits of nimbi, one behind the other, no heads showing. Two prophets stand at the sides of the arch

with extended arm as if preaching or exhorting. The whole is outlined in red. The oval glory is first seen here and at SS. Nereus and Achilleus.

S. Prassede, said to have been on the site of the house of Pudens, removed by Adrian I., was rebuilt by Paschal I., and covered with mosaics. The design of the subject in the vault of the apse is similar to that of SS. Cosmo and Damian, and shows the complete design as it once was with the twenty-four elders. At the summit of the vault is a hand of Deity; in the centre Christ stands by the river Jordan between palm-trees. Three persons are on each side; on the right, S. Paul, S. Praxede (with a crown), and Paschal (with a square nimbus), carrying the church; on one of the palm branches is a phœnix, symbol of the resurrection. On the other side S. Peter presents S. Pudentiana with S. Zeno behind; above is a band with sheep and a central lamb. The triumphal arch shows the worship of the Lamb from the Revelation. An oval-walled enclosure contains the Servants of God. Christ stands in the centre with an angel on either hand; at His feet are SS. Praxede and Pudentiana. On one side is Pudens, on the other Noratus and Timotheus. In front are the Elect, six on the right, seven on the left, holding crowns of oblation. The gates are guarded by two angels. Those who are not yet the elect are without nimbi; an angel, assisted by S. Peter, is selecting; below are great numbers of people. The chapel of S. Zeno has on the soffit of the arch medallions with busts; in the centre Christ and the twelve apostles, six on each side. The interior is covered with mosaics; the medallion of Christ in the centre of the vault is borne by angels who stand on globes, recalling the vault in the Archbishop's Chapel, Ravenna. The richness of the general effect causes this to be the principal show church in Rome for mosaics, though the style shows great decadence. Paschal built the chapel of S. Zeno as a burial-place for his mother Theodora. The church of S. Cecilia, in Trastevere, founded by Urban I. (223-30) on the site of her house, was also reconstructed by Paschal I. The vault of the apse shows very similar design; Christ surrounded by various saints and a strip of sheep below issuing from Jerusalem and Bethlehem. S. Mark's, at Rome, was decorated by Gregory IV. (827-44), and the apse mosaic is another imitation of SS. Cosmo and Damian. Venturi says it is probably the most barbarous mosaic in Rome. Above the arch are five circles containing a bust of Christ and the evangelists' symbols; below two figures with outstretched arm fill the spandril.

At S. Ambrogio, Milan, are some mosaics of this century. The apse vault of the chapel of S. Satirus is constructed, like that of the Baptistery of Ravenna, with pots, and from excavations made in 1859, which disclosed substructions of a little basilica with three apses of which this chapel occupied the centre, it is believed that it formed part of the ancient Basilica Fausta, and dates from the Vth century. The cupola and pendentives are covered with gold mosaic, upon which are placed a central disc with a bust of S. Victor (to whom the chapel was originally dedicated) and a border at the base of the dome. On the walls between the windows on the two sides are six standing figures in groups of three: S. Ambrose, with SS. Gervasius and Protasius, and S. Maternus between SS. Delicius and Nabor; these figures are costumed as Romans, and stand on a blue ground. On the pendentives are the symbols of the evangelists, and in the side lunettes medallions of apostles. The arrangement makes it probable that the centre medallion was once occupied by a bust of Christ. In the apse is a mosaic of Christ enthroned between SS. Gervasius and Protasius, and two flying angels. Below the throne are three medallions of saints, and at the sides, on the same level, are representations of the story told by Gregory of Tours of the soul of S. Ambrose attending the funeral of S. Martin of Tours while his body remained asleep in the basilica during mass. The arrangement of the scenes is the same as on the *pala di argento* made by Magister Volsinius in 835 for Angilbert. Venturi, however, says that this mosaic is in the XIIth-century Greek manner, that the palms have become mere ornaments, and that the way in which the small scenes invade the field betrays the inexperienced designer.

In the Cathedral of Capua are some examples made at the end of the century.

M. Gerspach says of these IXth-century mosaics: "The mosaicists have nothing but the feeling for colour of savage peoples. Colour without drawing, composition uniform and without inspiration, moral ideality replaced by size and attributes. Such are the characteristics of this period, the saddest of all in the history of art."

At S. Mark's, Venice, above the door of entrance from the atrium, one still sees Christ between the Madonna and S. Mary, a subject which was placed there in the Xth century. The Doge Domenico Silvio (1071-84) placed subjects from the Book of Genesis in some of the little domes of the atrium and some figures in the vault of the great central dome. At Grotta Ferrata, near Frascati, is a Basilican monastery founded by S. Nilus of Rossano in 1004. The church was finished in 1025 and consecrated by John XIX. on December 17 of that year; but there are earlier fragments built into the walls, and Di Rossi has published an inscription which mentions a church there, ascribed by him to the IVth or Vth century. There are two mosaics in it, one over the door from the porch into the church and the other over the triumphal arch. In the first the colours are dull and dark; the faces have character and some modelling, but are rather of Xth than XIIth century type. Christ is seated, blessing and holding an open book, with the Virgin on one side and S. John Baptist on the other, the Abbot Bartholomew appearing at the side of the throne on a lower level and very small. The draperies are stiff, and have no shading. The second is much more brilliant; the draperies are well cast, the heads have variety of type and a natural expression, but the details show decadence. The apostles are seated, six on each side of a throne, which is above the centre of the arch on a gold ground. On the front of the throne is a waved circle with a lamb within it holding a long cross and the book of life, on which is inscribed, "I am the door," etc. On the head of each apostle is a red flame with two points, and rays of light from a centre fall on their heads. S. Matthias appears in the place usually occupied by S. Paul. All have scrolls except SS. John and Matthew, who have books. The two end figures are in profile. The full strength of colour is in the shadow of the draperies, the lights becoming paler and colder by the admixture of white. The first of these mosaics is probably of the date of the consecration of the church, the other being later.

The monastery of Daphni, built in the XIth century, still preserves mosaic decoration which seems to be of that period. The ornamental bands have two red lines bordered with white surrounding and defining the gold ground, and the figures are also all on a gold ground. The costume shows antique tradition and the influence of the last Roman fashions. The modelling of the flesh is done by rule, and the position of the limbs makes no difference to the way the lighting is treated. The draperies are varied and finely cast, the gestures are simple and clear, and the heads have great variety of type. Contrast is always thought of in the compositions, and complementary colours relieve each other. The colours used are few; some three shades of red, five or six of blue, lilac, and brown, and a few more of green are rendered with vitreous pastes; the pale tones are marbles, white of Pentelicus, grey-blue of Hymettus, dull white, rose-coloured, and brown pebbles, black marble of Eleusis, and yellow tufa. In the drapery of Christ gold hatchings are used. The draperies are sometimes only outlined, sometimes two darker tints are used to express the modelling, sometimes broad half-tints and dead white lights gain effect by strongly-coloured shadows. The outline of the flesh is either green-brown, carmine-red, or black; the high lights are white, two carnations express the modelling in light, a half-tint green or blue a pale brown and two light greens are used in passing from half-tint to shadow.

At Nicæa a small XIth-century church, dedicated to the Death of the Virgin, still remains with some mosaic decorations. In the vault of the apse stands the Virgin Mother holding the child Jesus. On a gold ground her figure is detached in dark-blue drapery ornamented with gold. The Christ Child has a long gilded tunic; He blesses with the right hand and holds a scroll in His left. Both are nimbed, the Christ cruciferous. On the great arch at the entrance to the apse is a golden throne with a Book of the Gospels upon it in a blue circle; on the book is a Greek cross with an heraldic dove at the crossing with a cruciferous nimbus. Two angels stand on each side; on the right "archai" and powers, on the left lordships and "exousiai." They are richly clothed in long tunics of violet purple with broad orphrey of cloth of gold, girdle and purple boots, and have large white wings hatched with gold. They hold in one hand a standard with ΑΓΙΟΣ three times inscribed, as at S. Apollinare in Classe, and in the other a flowered disc on a bright-coloured piece of stuff. They have golden nimbi, curled hair, and are young. In the vault of the cupola of the narthex before the principal door is a golden cross of eight arms inscribed in a circle. In the pendentives the four evangelists are seated, and between them are four medallions with busts of Christ, S. John Baptist, and two saints. Above the door is a half-length of the Virgin in adoration in a violet mantle bordered with gold and veil of the same colour. The type of head is fine, the modelling good, the execution simple, and the draperies excellent. There is considerable resemblance to that at Torcello.

At Kiev a mosaic of the XIth century exists which was discovered in 1839.

The monastery of S. Luke of Stiris, in Phocis, a Byzantine structure of the XIth century, preserves a number of the mosaics which originally decorated it, though in the great dome and one of the pendentives beneath frescoes have replaced mosaic, and there are none in the vaults above the galleries. The walls up to the string-course at the sprining of the main arches are sheeted with marble, mosaic being reserved for the curved surfaces, and the tympana enclosed by the arches of the vaults. In the narthex the Twelve Apostles are placed on the soffits of the arches, and on the vaults are busts of saints. On the central vault is the Virgin in adoration, S. John Baptist, and SS. Michael and Gabriel. The wall surfaces beneath the arches bear—the Washing of the Disciples' Feet, the Crucifixion, a colossal half-length of Our Lord (over the door), the Descent into Hell, the Doubting of S. Thomas, and five medallions of saints. SS. Constantine and Helena are on each side of the window full length, and there are three other similar figures of female saints. Within the church the lower portions have figures of saints, and medallions are on the vaults. At the head of the Bema apse is a Virgin Mother and Infant Christ. In the dome is the Descent of the Holy Ghost, a throne and dove in the centre, and the apostles seated round with bears passing to their heads. The pendentives of the great dome contain the Annunciation (fresco), the Birth of Christ, the Purification, and the Baptism of Christ. In the recesses of the great square are half-lengths of Fathers of the Church, and on the walls of the Diaconicon are Daniel in the Lion's Den and the Three Holy Children. Messrs. Schultz and Barnsley made some excellent drawings of this church for the British School at Athens, a selection from which have been published, and M. Ch. Diehl has also described it.

The most important of the convents on Mount Athos, those at Vatopédi and Agia-Labra, were founded by S. Athanasius, and reconstructed and enriched by the Emperor Nicephorus Phocas in 985. In the tympanum of the door of the external narthex at Vatopédi is a Christ with the Virgin and S. John, just like that at Grotta Ferrata. An Annunciation in two panels is at the sides of the door, and the same subject is within. The dedication is to the Annunciation. On the tympanum of an inner door is S. Nicholas. The arrangement of subjects in all these monastery churches is as follows:—In the narthex there is always the Last Judgment, at the sides warrior saints armed and with sword in hand guard the entrance. In the interior narthex Old Testament subjects appear or the histories of martyrs. The Death of the Virgin is

often over the entrance door, and the Life of Christ on the side walls. The arms of the Cross are reserved for soldier saints and those who protected the youth of Christianity, isolated full-faced figures on a gold ground. In the centre of the cupola is a figure of Christ surrounded by archangels; little cherub heads fly above them. In the pendentives are the evangelists. The subjects are painted, but show the usual distribution, which may be usefully compared with that in the Sicilian churches.

The dome of the Cappella Palatina, Palermo, has a Christ blessing at the summit; four angels richly clothed and four archangels stand round below between the little windows. Lower still, on the drum, are David and Solomon, Zechariah, and S. John Baptist, and the evangelists are in the angle niches; below these are the busts of eight other prophets. The inscriptions are in Greek. A Great Christ is in the apse vault, the mosaics below which have been altered and restored. The triumphal arch has in the centre the throne with symbols of the Passion, and at the sides the Archangels Michael and Gabriel. In the transepts are scenes from the Gospel referring to the Twelve Great Feasts of the year. Above the triumphal arch are the Annunciation and the Purification; on the south wall the Flight into Egypt, the Epiphany, the Resurrection of Lazarus, and the Entry of Christ into Jerusalem; above the northern apse the Nativity; on the vaults of the side portions Pentecost and the Assumption. At the same level are figures of the Prophets Amos, Obadiah, Habbakuk, Hosea, Zephaniah, Malachi, Micah, Samuel, and Joshua, and Isaiah and Joel, who point out the prophecy, "Behold a Virgin shall conceive," etc., on a scroll. In the nave are scenes from the first thirty-two chapters of Genesis, and on the arch which separates nave from presbytery two angels, who offer prayers and offerings. On the west wall is a throned Christ with SS. Peter and Paul. A series of figures of the successors of the apostles, representing the Militant Church, are below; along the nave and transepts and on the walls of the aisles are represented the doings of SS. Peter and Paul. These mosaics are of several periods, and have been frequently restored. The inscriptions are sometimes in Greek and sometimes in Latin. The Greek is principally on the right hand, and where silver tesseræ are used among the gold. The silver band of the cupola bears the date 1143.

At the Martorana, Palermo, founded by Georgios Antiochenus, Grand-Admiral of Roger I., in 1143, and therefore originally called S. Maria dell' Ammiraglio, the summit of the cupola is occupied by a full-length figure of Christ seated on a throne surrounded by a choir of adoring angels. Around the drum are figures of prophets, and in the niches below the evangelists. On the vault of the first great arch are the Nativity and the Death of the Virgin. On the outside of the triumphal arch is the Annunciation and on the inside the Presentation. At the entrance to the sanctuary the figures of SS. Michael and Gabriel remain (as at S. Apollinare in Classe, Ravenna), the rest of the apse having been destroyed in the XVIIth century. On the nave walls are figures of SS. Peter, Paul, Andrew, and James, and other Greek saints, and in the smaller apses half-lengths of S. Anna and S. Joachim. The aisle vaults are blue with golden stars. Two mosaics of historical interest are preserved on the walls of what was once the vestibule, King Roger Crowned by Christ and the Admiral at the Feet of the Virgin, the latter much and badly restored.

Other excellent mosaics are in the Cathedral at Cefalù, founded in 1131 by King Roger. The semi-dome of the apse is filled with a colossal Christ, rather Jewish in type; the vault of the first bay bears four cherubim, and at the springing of the arches four half-figures of angels. Below the Christ is the Virgin in the traditional Byzantine attitude of prayer; an angel stands on each side of her. The Twelve Apostles stand below divided into groups of six by the pointed Eastern window. At the top of the north wall is a circle with a half-length of Melchizedek, flanked by Moses and Hosea, and below them the Prophets Joel, Amos, and Obadiah, below whom come two ranges of saints; in the upper SS. Peter, Vincent, Laurence, and Stephen; in the lower SS. Gregory, Augustine, Sylvester, and Dionysius. The south wall has SS. Nicholas, Basil, Josephus, and Gregory Theologos facing them; above whom are SS. Theodore, George, Demetrius, and Nestor. Then come the Prophets Jonah, Isaiah, and Nahum; while David and Solomon, with Abram between them, finish the composition above. The columns of the sanctuary are also covered with mosaic and the corbels of the vaulting-shafts. The lettering is partly Greek and partly Latin, confirming the tradition that Roger imported designers from Mount Athos to execute them. The selection of the saints makes this all the more likely, as does the constant appearance of S. Basil in an important place. The treatment, costumes, and gestures of the earlier Sicilian mosaics are invariably Greek. The later ones show the Latin mode of blessing as well, the Latin cross held in the hand, and Latin inscriptions; but Greek costume still is most frequent. The Latin inscription below the range of apostles at Cefalù gives the date 1148, but the vault of the first bay of the choir is later, probably of the period of the destroyed portico mosaics, which showed portraits of Roger II. and William I. and II., Roger offering to the Saviour a little symbolic building and the others confirming the gifts with new offerings. Another showed Constance, and yet another Frederick II. on a throne, sending John Cicala, Bishop of Cefalù, as his legate to Damascus and Babylon.

At Monreale the costumes in the mosaics are Byzantine, and above the great arch, between nave and choir, is the image of Divine Wisdom (ΑΓΙΑ ΣΟΦΙΑ), before whom SS. Michael and Gabriel prostrate themselves. The vault of the apse is filled by a colossal Christ, as at Cefalù. In the two side apses SS. Peter and Paul, seated on thrones, bless and hold a book on their knees; below these large figures their martyrdom is represented. The general subject of the mosaics is the Triumph of Christianity in prophesy, in fulfilment, and in the majesty of the Church founded by Christ. The walls of the transepts and of the nave show Old Testament subjects and the most important events in the life of Christ; while those of the sanctuary and the *solea* are occupied by subjects from the Acts of the Apostles, and figures of angels, prophets, patriarchs, and saints of every kind magnify the triumphs of the Orthodox Church. These mosaics have been restored many times, the first occasion when serious reparation was undertaken being in 1495, when a Monrealese, Masi di Oddo, with members of his family, worked for eight years at their restoration.

The best of the subjects, such as the Martyrdom of SS. Peter and Paul and the Entry into Jerusalem, show a purity of drawing and delicacy of type which prove that the designers must have been capable painters who studied from nature without striving to overpass the proper limits of decorative art. In some of the figures (as in a niche in the S. Aisle near to the eye) the tesseræ are almost as small as in antique pictorial mosaic. These mosaics were executed one hundred years before the birth of Cimabue and two hundred years before the death of Giotto.*

F. H. J.

WORKING MEN'S COLLEGE, ST. PANCRAS.—The programme for the winter session, opened on September 28, embraces a University Extension course of lectures by Mr. J. Banister Fletcher, upon "The History of Architecture." A new class—"Studies in Sculpture, Painting, and Engraving"—is established under Mr. John Scott's superintendence.

BATTERSEA POLYTECHNIC.—The present session began on September 11, and the day college and courses were reopened on September 17. In the evening classes department new classes are opened in architecture, enamelling, and art-metal work, and motor-car engineering (honours). Extended accommodation has been made for motor-engineering students, and for the secondary education of girls. On the day students' side there are classes in mechanical, electrical, motor-car, and chemical engineering, in courses of two and three years' duration for University and professional examinations, and in art, and secretarial and commercial work.

* To be continued.

ENGINEERING AND MACHINERY EXHIBITION.—I.

THE exhibition which was opened on September 15 at Olympia, and will remain open until the middle of October, contains a large and varied collection of engineering appliances and machinery, filling all available room on the ground floor of the main hall. There are many exhibits of interest to architects and building contractors, as well as to engineers, and it may fairly be said that the exhibition has achieved a real measure of success. Still, the fact remains that British engineering is very inadequately represented. Very few of our great industrial firms have supported the venture, and the exhibitors who have taken stands consist largely of those making or selling machine tools and sundry appliances and materials in general use by engineers and contractors. The bulk of the remaining stands relate to steam boilers and engines, gas engines, electric and gas-lighting apparatus, pumps, tubing, valves, and steam fittings. Structural materials, weighing machines, cranes and lifts, time-recorders, heating, ventilating and drying apparatus, and appliances for preparing and copying drawings are also exhibited in various parts of the hall.

Although, as remarked above, the exhibition affords a very incomplete index to the great engineering industries of Great Britain, the individual exhibits are of admirable character, and in numerous instances serve the useful purpose of demonstrating the successful application of machinery to the requirements of daily life.

Among the more noteworthy examples of British-made machine tools are those shown by Messrs. Armstrong, Whitworth, & Co., of Manchester; Bateman's Machine Tool Company, of Hunslet; Joshua Heap & Co., of Ashton-under-Lyne; John Holroyd & Co., of Milnrow; G. Richards & Co., of Broadheath; and John Stirk & Sons, of Halifax. Two tools exhibited by Messrs. Armstrong, Whitworth, & Co., which illustrate the great capacity of high-speed steel for both turning and drilling, are respectively an 18-in. centre electrically-driven lathe capable of taking a cut 1½ in. deep by ¼ in. wide at the rate of 30 ft. per minute, and finer cuts down to $\frac{1}{16}$ in. wide at rates up to 400 ft. per minute. This machine is shown in operation, and the massive turnings pared off by the tool form an excellent object-lesson of the enormous saving of time effected by modern lathes and tool steel. Messrs. G. Richards & Co., in addition to air-compressors and auxiliaries, have on view several well-designed tools, including boring and turning mills, planing machines, and a slot-drilling machine, all driven by electric motors. A distinct advance in the construction of planing machines is marked by Bateman's high-speed planer, which performs work with the rapidity obtainable on the lathe by the use of modern tool steel. Two important improvements are embodied in this machine—one being an arrangement by which the motion of the table is reversed at the end of each stroke without perceptible shock, and the other is effected by the application of a heavy fly-wheel at either side of the machine so as to store up and give out energy at the moment of reversal. The machine is entirely self-contained, the electric motor and change-speed gear-box being fixed on a platform above the main framework. The gears give a range of cutting speeds varying up to 80 ft. per minute, and the return speed is constant at 210 ft. per minute, thus almost entirely abolishing the usual loss of time on the return stroke. To architects and building contractors the "Shaftometer" on the stand of Messrs. J. Stirk & Sons will possibly be of more interest than the turning, boring, and slotting machinery exhibited by this firm. The "Shaftometer" is a special form of spirit-level with a tube 12 in. long, which is so graduated that readings are given in thousandths of an inch. Then the total variation of the shaft can be quickly converted into sixty-fourths of an inch by reference to the calculating scale provided on the instrument. However true a shaft may be when first erected it will not remain so for long, as the bearings inevitably change their relative positions owing to unequal subsidence of the building upon which they are fixed. As the slightest deviation in a shaft from the level causes a considerable amount of friction, the use of an accurate instrument

such as this enables coal bills to be reduced and the risk of breakdowns to be diminished.

American and German machine tools are much in evidence at the attractive stands of Messrs Buck & Hickman, Burton Griffiths & Co., C. Churchill & Co., Ludwig, Loewe, & Co., H. Pels & Co., Schuchardt & Schutte, Selig, Sonnenthal & Co., and Veilhardt & Hall. To mention all the objects of interest in these exhibits would occupy more space than is available, and we must limit references to a few examples. A brass-finisher's turret-lathe, shown by Messrs. Buck and Hickman, deserves careful examination by all who are engaged in the production of valves, cocks, and other appliances on which several faces have to be machined. The lathe is fitted with a special form of automatic revolving-chuck by which eight faces can be finished at one chucking and without stopping the machine. Messrs. Churchill & Co. show a selection of tools specially chosen as examples marking distinct advances or embodying novelties of design and construction.

Three machines, exhibited by Messrs. H. Pels & Co., appealing specially to structural engineers, are a joist-shear, cutting any section from 2½ in. by 2½ in. up to 16 in. by 6 in.; an angle and tee-bar bevel cropper cutting angles and tees on the square up to 6 in. by 6 in., and at any angle (from 45 deg. to 90 deg.) up to 5 in. by 5 in. or 6 in. by 4 in.; and a notching machine capable of dealing with joists and channels up to 16 in. by 6 in. All these machines are driven by Westinghouse electric motors, and work smoothly without perceptible shock. One structural feature to which attention may be directed is that the framework is built entirely of steel, thereby insuring rigidity, reducing weight, and saving floor space.

A representative assortment of pneumatic and electric portable drills and tools will be found in operation at the stand of the Consolidated Pneumatic Tool Company, where may be seen hammers for stone and metal, drills, and appliances for tube-expanding and cutting, reaming, and an assortment of electric drills with magnetic drill-posts. The Howard Pneumatic Engineering Company, of Eastbourne, exhibit pneumatic drills, hammers, riveters, grinders, and a pneumatic deck-planing machine, all these appliances being shown in operation and actuated by air from a Howard compressor. Sheet-metal-working machinery is represented by an excellent selection on the stands of Messrs. W. Waller & Co. and Mr. L. Schuler, where box-making machines are strongly in evidence.

Various types of grinding and sharpening apparatus are to be found among the exhibits of machine tools, and in addition are brought prominently to the front by three or four firms. Messrs. Brunton & Trier show examples of Trier's patent grindstone, emery and carborundum wheel-dressers, which embody the principle of their ingenious stone-dressing machines, which have been fully described in previous issues of the *Builder*. The Carborundum Company make a comprehensive display of grinding-wheels, rubbing-blocks for foundrymen and stonemasons, carborundum powder and grains, carborundum paper and cloth, and carborundum discs for grinding machines. A most interesting exhibit is the automatic twist-drill grinding machine, shown at work by the Agenoria Company, who also display a selection of Schmaltz's automatic sharpening machines for circular, band, and frame saws, a cylinder grinding machine, and other grinding machinery.

Before passing entirely away from apparatus allied with the category of machine tools, we must mention two or three useful varieties of hoisting apparatus. One is the handy little portable crane of Messrs. Selig, Sonnenthal, & Co., a machine standing about 6 ft. 6 in. high, and mounted on wheels so that after raising the load it can be run from point to point on any level floor. Another, by the same firm, is a portable crane with a gib that can be extended and withdrawn by means of a handle without moving the crane itself, and that can be revolved through a complete circle. Messrs. Jessop & Appleby Bros. confine attention to a strongly-built type of portable steam crane made in sizes ranging from 5 tons to 12 tons power to lift, slew, derrick, and travel by steam. The Temperley Transporter Company exhibit actual examples of their patent traveller and patent grab, but are only able to show working models of their well-known transporters owing to the large dimensions of the apparatus. Among numerous examples of hoisting-tackle, the worm-geared pulley-block of the Mork Patent Pulley Block Company deserves special notice. This apparatus has a releasing gear which sets the worm free so that the lower block can be run down or pulled up rapidly whenever desired. Then, by pulling a hand-chain in either direction, the worm is instantly re-engaged for hoisting. The same device is also applied to blocks used on runways. Hoisting apparatus applied to domestic requirements is represented by the working models and gearing exhibited by Messrs. Joseph Richmond & Co. One model shows the principle of the Richmond-Carry automatic electric lift for both passenger and goods lifts, and another illustrates a newly-patented automatic electric push-button service lift.

We may here take the opportunity of referring to the improved type of steelyard embodied in the most recent form of weighing machines made by Messrs. David Hart & Co. The new pattern has been devised to prevent wear of the V-notches which fix the position of the large sliding weight. By means of large rectangular slots at the back of the steelyard and a corresponding tongue on the sliding weight, the latter can only be moved along the yard when it has been lifted high enough for the tongue to clear the slot and the knife-edge to clear the face on which the V-notches are cut. The weight can only be lowered when the tongue has entered one of the slots, and the knife-edge will then fall exactly into the centre of the corresponding V-notch. This arrangement makes it impossible for careless users to damage the top of the steelyard and to reduce the accuracy of the machine by altering the form of the notches. The same firm have also a new type of multiple steelyard giving readings in three or four different systems of weights, but this device is not shown at the present exhibition.

(*To be concluded next week.*)

THE "OLD BAILEY" SESSIONS HOUSE.

THE large building from the designs of Mr. E. W. Mountford, which occupies the site of old Newgate prison, is now all but completed, although there seems to be some doubt as to its being actually opened next month.

The exterior is by this time familiar to all passers-by between the City and the central district. We gave an illustration of it at the time of the competition, which, with the plan, will be found in our issue of June 30, 1900. If it has not the gloomy grandeur of old Newgate, it is a fine and striking building, in the details of which some of the character of the old building is preserved. The ground story is treated with bold rustication, and heavy keystones to the square-headed windows under the arched openings. The two upper stories are decorated at the Newgate-street side with an order of pilasters, developing into a columnar order in the centre portion where the upper wall is recessed. Pilasters and coupled columns are introduced also in the centre of the west front. The strongly marked cornice is continued all round the two fronts.

The principal entrance, over which is a sculptured group of three figures by Mr. Alfred Turner, is defended by massive gates of hammered iron, executed by Messrs. Ramsden & Carr, which, though simple in design, are very effective and well suited to their position and to the general style of the building. These give access to the lower hall, which extends the full length of the building; a wide area in the centre, while the right and left hand portions are divided by columns and arches into two aisles. The principal staircase, opposite the entrance, leads up to the great hall which is the principal feature of the interior, and forms a kind of *salle des pas perdus* in connexion with the courts. Over the centre portion is a dome the surface of which is panelled out into four sections, decorated with mosaics by Mr. G. Moira, the designs symbolising Truth, Wisdom, Knowledge, and Labour. A heavy cornice runs round the base of the dome, beneath which are four large arches and pendentives, the spaces on the latter being decorated with basreliefs by Mr. Pomeroy, the subjects symbolising Justice, Mercy, Charity, and Prudence. The lower vaulted portions of the hall, on either side of the domed space, have large lunettes three of which, on the south side, have been filled with large decorative paintings by Mr. Moira, which represent Moses and King Alfred, as great lawgivers, and Homage to Justice. On the north side is a painting by Sir W. Richmond, a decorative landscape with a group of nude figures, representing the Golden Age; it is very effective in composition, though it is not easy to see what is its significance in a building of this kind, as it seems to recall (or prophesy) a time when justice and law were unnecessary for a people who were always happy and good. It may be as well, perhaps, to have some suggestion of this kind to call up happier associations than those generally connected with the exercise of criminal law. The lower portions of the walls are richly and effectively veneered with Pavonazza marble in panels surrounded by a framing of Cippolino which makes an effective contrast. The floor is laid with a design in marble in large and simple lines. The whole effect is fine and dignified.

Two courts are approached from corridors at each end of the hall. Of these four courts, two are treated on a Greek cross plan with a segmental glass dome over the centre; the two others are longitudinally planned and barrel vaulted. We should have expected rather an echo from the glass in the domed courts, but the scale is not very large and the acoustic conditions do not seem to suffer. The fittings of all the courts are in oak, of a generally plain and solid character, decorated by mouldings more than by carving, and with a severe but sufficiently architectural character. This oak woodwork is used throughout the fittings both of the courts and the numerous rooms connected with them.

There is a special oak staircase for the mayor and the judges. There seems to be some uncertainty at present as to the ultimate disposal of the rooms; but those which were first planned as the judges' rooms, with a separate corridor of their own, and in immediate contiguity to the courts, seem very well suited for this purpose, and may probably be retained as such after all, though there has been a suggestion for placing the judges elsewhere; for what reason is not very clear. The rooms for witnesses are ample, including a large general room on the ground floor for witnesses in attendance, and rooms on the court level for those immediately wanted.

Though the new building is not, like old Newgate, a prison for the permanent detention of malefactors, there are a very large number of cells, in four stories, for temporary detention. These are arranged so as to be entirely cut off from all connexion with other portions of the building; the stairs leading up to the court docks being the only intercommunication. We feel rather surprised that the system of taking up prisoners into the dock by lifts has not been tried in any courts of modern construction; it would be a saving of space, as well as affording much better opportunity of controlling prisoners who were violent and refractory.

The arrangements for heating and ventilation form a great portion of the structural work of the building, the portion of the basement devoted to this function forming a whole labyrinth of chambers and passages. Mr. W. Key has had this part of the work in hand. The air is brought in and driven through the building by eight steam-driven fans; passing first through a screen of perpendicular glass tubes placed nearly close together and served with a small cataract of water running down them; this picks up the grosser particles of dirt. Inside of this are steam-pipe coils, not for the ultimate heating for the rooms, but to bring the air through in a fairly warm state in winter. Then it passes through the usual moist oakum screen for damping and further cleansing, and then past the steam coils which bring it up to the final temperature desired. There are separate ascending flues and heaters for each room, numbered or named and capable of being opened or closed as required. Two things strike one in going through such an installation;

first, how much of the mechanical force has to be expended in overcoming the resistance of the two successive cleansing screens; second, how much trouble ought to be considered necessary to keep all this length of air-passages themselves clean. That is one of the points against the plenum system of combined heating and ventilation, that there seems so much chance for the air to pick up dust and impurities in the passages themselves, after it has gone through the cleansing screens; and it seems doubtful whether the air chambers ought not to be lined with something smoother and more washable than brick walls. But this of course would add to the cost of what is a costly enough scheme in itself.

With the exception of the group over the principal entrance, before referred to, Mr. Pomeroy has modelled all the sculpture in the building. His figure of Justice which crowns the cupola was cast by Messrs. Singer, of Frome. Mr. G. Moira, besides his mural paintings, has designed the stained glass; the two windows on the grand staircase are very effective; they are treated in small square leaded panes which give a close texture, and with rich colouring and a large and full style in the decorative details, producing a style of window which is suited to a Renaissance building, while it has a kind of Mediæval richness of effect, instead of the hard texture which one sometimes sees in modern stained glass in the Renaissance style.

Messrs. Holloway have been the general contractors. The principal sub-contractors are: for the marble columns and wall linings, Messrs. A. Lee Brothers; for the marble paving and staircase, Messrs. Anselm Odling & Sons; for the various lifts, Messrs. R. Waygood & Co.; for the fittings and furniture, Messrs. Hampton & Sons; for the decorated ceilings, Mr. G. Bankart. All the sanitary fittings and wall tiling have been done by Messrs. Doulton & Co. The glass mosaic is by Messrs. Rust's Vitreous Mosaic Company. Messrs. Ramsden & Carr have done the more elaborate electric light fittings, the entrance gates, and the balconies. The other electric light fittings were done by Messrs. Bainbridge Reynolds; they have also done the glass and iron hood over the Lord Mayor's entrance, and other metal work in the building. The electric wiring and light generally is by Messrs. Cash & Co., the courts being lighted entirely by reflection. Mr. Seale has done what may be called the architectural carving, also some of the ornamental plaster work. Mr. Scales has acted as clerk of works.

THE HOLMAN HUNT EXHIBITION.—The opening of the exhibition of the collected works of Mr. Holman Hunt, at the Leicester Galleries, Leicester-square, is now fixed for Saturday, October 6. With the exception of "The Light of the World," which is now in the Colonies, all the most important of Mr. Hunt's works will be shown. The City of Birmingham is lending "The Two Gentlemen of Verona" and "Christ in the Temple," and the Manchester Corporation "The Shadow of Death" and "The Hireling Shepherd"; besides which there will be the "Triumph of the Innocents," "The Lady of Shalott," the portrait of himself intended for the Uffizi Gallery, and numerous other paintings and water-colours. The exhibition will be open for six weeks.

TRAMWAYS THROUGH BLOOMSBURY.—The St. Pancras Borough Council have given their statutory consent, in so far as the borough limits are concerned, to the London County Council's proposed Bill for the construction of tramway lines through Tavistock and Russell squares. The new tramways will connect the northern and southern lines by means of the Kingsway subway, and will furnish a fresh route to Euston terminus. The London County Council's scheme provides for double lines from the subway, Southampton-row, to Russell-square, and through Tavistock-square and Upper Woburn-place to Euston-road and Seymour-street, with single lines along Tavistock-place, Upper Bedford-place, and Russell-square, and along Woburn-place, to be constructed for the conduit system, at an estimated cost of 72,450*l.*, for the aggregate length of 2¾ miles. They propose also to lay down branch lines from New Oxford-street, along Hart-street and Vernon-place, to the subway; and either along Bloomsbury-street, Bedford-square, Gower-street, and Francis-street, or along Tottenham Court-road, to Francis-street, to join the extension from Euston-road, at a cost of 51,000*l.*

BUILDING-STONES AND FROST.

BY W. R. PURCHASE.

IN your issue of September 15 there appeared a short article, entitled "Notes on the Resistance of Building-stones to Frost," by Professor J. Malette, of Paris. Will you kindly permit me to make a few remarks on this subject from a practical point of view, not in a cavilling spirit, but simply with the object of eliciting further truths which may be helpful in selecting a good building-stone.

I am aware of the boldness of venturing an opinion opposed to that of an eminent *savant*, but the ideas, crude perhaps as they are, emanating from practical observations, may make evident some trace of those principles which govern and recommend the more scientific productions.

A statement is made *re* Mons. Brard's process as follows:—"Although not enabling the problem to be solved in a direct and absolute manner, it furnished approximate results that were formerly accepted as sufficiently satisfactory."

Exception, however, has many times been taken to this process, and the fallacy of the plan was pointed out as long ago as 1840 by the late Mr. C. H. Smith in a paper on "Lithology," read before the Royal Institute of British Architects (*Transactions* R.I.B.A., Vol. I.), wherein he quotes from a Parliamentary Report and gives a list of well-known British stones treated by M. Brard's method; and according to these tests some of the best of our weather stones are those that will disintegrate the most, and, *per contra*, those stones of the most decomposable quality are standing high on the list which it is suggested will stand the weather.

For instance, among others, he gives the following as less likely to be good weather stones, viz., Taynton, Ham Hill, Chilmark, and Barnack; whereas Taynton stone is remarkable for its very perfect condition wherever it has been used at Oxford. The same may be said of Ham Hill, a stone extensively used in the "west country"; Salisbury Cathedral, built with Chilmark stone, is generally in a good state of preservation; Barnack is much used in the old buildings at Stamford and neighbourhood, including Peterborough Cathedral, and these are generally in a good state of preservation.

Mr. C. H. Smith states:—"However ingenious the plan recommended by M. Brard may be, the effect produced on the stone by his experiments is, in the greater number of instances, diametrically opposite to that which would result from the action of the weather on similar materials after having been exposed to its influence many years; consequently, such a mode of procedure is not to be depended upon, and will always be liable to erroneous conclusions."

Coming to the process recommended by Professor J. Malette, which is certainly very subtle, the treatment meted out to these small samples of stone seems drastic, unduly protracted, and altogether abnormal. It is based upon successive and rapid variations of temperature; that is to say, it undergoes twenty-five freezings and thawings in the course of a few days.

If we compare this mode of treatment with that of nature, whose physical forces and agencies, within and without, work silently and invisibly, we must at least confess that there is a difference in the two processes deserving the utmost consideration, for it will be found to vary materially, both in detail and result.

It is an axiom well known that the weathering power of a stone is dependent upon its physical structure, its composition, and the nature of the atmosphere in which it is placed.

The most destructive agent that the stone has to contend against is rain or a moist atmosphere, and also, in a minor degree, frost, wind, and smoke.

It may not generally be known that, although a stone may be very porous and absorbent and apparently open to frost, it may also be extremely durable, its durability depending on the cementitious material which holds the grains together being strong enough to resist the physical forces acting upon the stone, such as the rain, frost, wind, etc. Examples of this are found in the durability of the shelly oölites, such as Ancaster, Casterton, Doulting, Ham Hill, Ketton, etc.

Again, the rainfall of the district in which a building is situated is an important factor in the capability of a stone to resist physical disintegration by frost; this is materially controlled by the structure of the stone and its power of resistance to chemical agents.

A factor which seems to have escaped the notice of scientists, and shows the potentiality of frosts, is that very hard, dense, and compact sandstones, with but little absorption, such as the Blue York from the neighbourhood of Bradford and Robin Hood from Wakefield, etc., are more liable to be affected by frost than are open or coarse lime or sandstones of a softer nature and two or three times as absorbent. It has come within my observation that large blocks have been split through and virtually spoiled by the action of severe frosts; these fractures would take place along the lines of lamination, although these lines were scarcely discernible to the eye, and never in a vertical direction across the bed.

Chemical tests to determine the quality of a building-stone for durability are admitted by practical men to be somewhat unreliable. The processes which are carried out with apparent success in the laboratory of the chemist are generally of doubtful value when brought into practical use. As laboratory-work these experiments are no doubt of an interesting character, for infinite pains seem to have been taken to produce results that may be termed unnatural, and the results so obtained are only at least an approximation to what the effects of the weather would be on the same material when extended over a long period.

Although much progress has been made of late years in scientific knowledge, owing to the researches of eminent scientists, such as Professors Geikie, Beare, and Unwin, who have done excellent work in this direction, it is doubtful whether any general principles or data can be deduced by which a correct judgment or estimate can be formed as to the weathering properties of any building-stone or its capability of resisting frost.

There is in the foregoing remarks no wish to depreciate or disparage the true value of tests by chemical analysis, but on the contrary. These, however, should be confined to ascertaining the component parts of the stone, its cementing material, the absorption of water, the homogeneity of its structure, and other useful data.

In fact, there is no detail in connexion with stone that one should not be familiar with.

Builders' and Contractors' Column.

THE BUILDING TRADE IN INDIA.

INDIA is an Empire fifteen times larger than Great Britain and Ireland, with a population of some 300,000,000. The building and allied trades are among those that will flourish in the near future, and those firms who get securely planted in the country now will reap their reward later on.

India is striving to become self-supporting, and the Government is encouraging local industries. With the expansion of the Indian Empire in all directions building on improved British methods, whenever possible, is being adopted. India follows Britain in fashion, which is an encouragement for British manufacturers to study the country with keener interest.

The old-fashioned method was for manufacturers and exporters to canvass commission agents or shippers, principally in London, who dealt with India for any orders they might have; but that is a method of the past. The buyer or actual user in India is the man now responsible for placing orders, and catalogues (not too bulky) should be posted out direct to him occasionally. Then the orders return through the various British commission agents or merchants for payment and shipment. Whenever possible, all goods should be quoted "free-packing" and free-on-board (f.o.b.) export steamer, or better still c.i.f.—*i.e.*, cost-insurance-freight—to Calcutta, Bombay, Madras, Rangoon, Karachi, or Colombo, as required by the

buyer, who then knows the actual net cost of the goods delivered from the steamer at the Indian port.

This is an expansive and rapidly expanding market to gather orders from, and it will take any exporter at least three years to understand the peculiarities of the country, full as it is of jealousies, suspicion, rivalries, and other Oriental peculiarities. Railways, municipalities, local boards, mills, gardens, estates, schools, hospitals, clubs, hotels, barracks, harbours, public buildings, etc., are all being improved and added to, according to local requirements, after modern and up-to-date British ideas.

The railways have a total mileage of 27,565, with a capital outlay of 237,575,000*l*., and employ a staff of 421,866, and within the next few years many millions are to be expended in extending the railway system. The municipalities number 763, with a population within the municipal limits of 16,750,916, with a total yearly income of 6,579,094*l*. and a yearly expenditure of 6,414,010*l*. Of this amount 2,296,000*l*. were spent in water supply, drainage, conservancy, hospitals, dispensaries, markets, slaughter-houses, public gardens, roads, buildings, etc. The district and local boards number 1,085, with an annual income of 2,519,000*l*. and expenditure of 2,493,800*l*., spent on civil works, sanitation, education, hospitals, etc., the incidence per head of population of municipal rates and taxes being 2s. 9d., and of district boards 3d.

Among the ranks of native Indian workmen are—masons and builders, 341,662; carpenters, 979,543; iron and steel workers, 583,507; earth and stone workers, 1,036,682; excavators and well-sinkers, 253,575; railway and road labourers, 328,657; general labourers, 9,238,596; shopkeepers and dealers, 747,060, etc. Although the native workman's wage is poor, it corresponds with the quality of his labour, and British skill has to teach the illiterate native, often against his will, his caste, and his hereditary trade peculiarities that have been handed down in his family from generation to generation. But with the technical education and scientific teaching that is now being pushed forward a more intelligent native workman will be found in the future, who will not be long in letting his employers know of it.

Last year 65 per cent. of imports into India were from the United Kingdom. Metals amounted to 505,869 tons, valued at 93¾ lakhs (a lac or lakh of rupees being Rs.100,000), over 60 per cent. of which belonged to iron and steel, which is an indication of the industrial development, and it likewise emphasises the want of an iron manufacturing industry in India. The iron and steel imports consisted of bars, galvanised and tinned sheets and plates, hoop, angle bolt and rod, angle channel and spring, beams, pillars, girders, and bridge-work, pipes and tubes, nails, screws, rivets, and washers. The competition with British manufacturers has been chiefly in the common and cheap articles, viz., angles, bar, plain sheets, nails, screws, and rivets. Tin comes almost wholly from the Straits Settlements; value of imports, 39½ lakhs. Building materials were imported to the value of Rs.35,30,727, as against Rs.28,70,853 the previous year. Glass represented Rs.112,57,101, as against Rs.99,20,759 the previous year. Painters' colours and materials, Rs.46,91,972. The value of machinery and mill-work reached the unprecedented total of 402¾ lakhs, an advance of 20 per cent. over the previous year, which was likewise an advance of 20 per cent. over the year before that. Railway materials, which include rolling stock as well as materials for construction, represented the great importation of 561 lakhs, being 141 lakhs for private lines and 420 lakhs for State lines. The import trade in timber is growing, being valued at 37 per cent. greater than the previous year, two-thirds being teak from Siam, which is taking the place of Burma teak. This gives a faint idea of the yearly imports into India as affecting the building trades, and India is yet in its commercial and industrial infancy.

That agriculture is the foundation on which rests the whole economic structure of India is nowhere so plainly revealed as in its gigantic export trade, and the harbours, jetties, railway rolling stock, sheds, buildings, etc., are being enlarged and increased to cope with the development of this branch of the country's commerce. Out of an area of 554,234,736 acres 67,136,162 acres are under forest. During last year 234 miles of roads in the United Provinces were planted with trees, and there are still 19,700 miles of roads without avenues. Road arboriculture shows a profit.

There is no false modesty in Indian trading, and a firm may have many interests at stake. There is likewise no commercial patriotism, and builders and contractors purchase from the manufacturer who supplies goods suited to Indian requirements, whether it be from Britain, America, Japan, or the Continent. Thus one European firm established in India announce themselves to be architects, surveyors, builders, contractors, plumbers, and decorators. Another firm are builders, sanitary engineers, plumbers, gasfitters, drainage and general contractors. Another builders, contractors, machinery agents, importers of high-class English and American tools and machinery, automobiles, and electrical specialities; whilst a fourth firm are builders, contractors, civil, mechanical, marine, electrical, and structural engineers, all kinds of architectural faïence and mosaics for inside and outside decoration, colliery work, iron and steel roofs, bungalows, bridges, municipal and district board requirements. These illustrations give a general idea of the elastic commercial mind the successful trader in India may usefully possess; his mind and business grow with the requirements of the country, he does anything and sells anything there is a local demand for. In a word, he has no more modesty than a co-operative store in Britain. What is required in India is a man to make local investigations, and a builder and contractor of such capacity and breadth of view as to be able to adapt himself rapidly to local conditions.

In order that the progress of the country shall not be thwarted British and foreign manufacturers are holding stocks of their goods in India, either at their own depôts, managed by their own salaried representative, or at commission agents'. Among manufacturers represented to-day may be classed nearly all those who are anxious to secure a portion of the local trade. A North of England firm holds a stock of 3,000 tons of beams of various sections and sizes; 1,200 tons of Carnegie rolled steel beams, angles, tees, plates, etc., are kept in Bombay; local agents have 10,000 casks of British cement on hand; 2,000 tons Westralian Jarrah wood scantlings are at a depôt; 2,000 tons corrugated iron in Calcutta, etc., and so on.

The Indian importer is frequently handicapped when buying from Britain in not knowing when the goods will arrive or what the exact cost will be delivered. By holding stocks on the spot these difficulties are overcome, and all orders are executed with businesslike celerity. Imagine waiting at least three months for goods to arrive at the present day of keen competition. Britain is not the only nation endeavouring to capture the Indian trade, and cargo steamers ply between the Indian ports and Adelaide, Melbourne, Sydney, New Zealand, Japan, Boston, New York, South African and South American ports, Hong Kong, West Indies, etc., to say nothing of Continental steamers from European ports. This points to the way the wind is blowing, and the expansion of inter-colonial trading is a new competitor which British makers will have to reckon with in the near future in Indian commerce.

In regard to finance, it may be said that the rupee in exchange can be taken at 1s. 4d. and the anna at a penny. Thus Rs.2·8 equal 3s. 4d. The general import custom duty on goods into India is 5 per cent. *ad valorem*, some are subject to 1 per cent. *ad valorem*, whilst some metals, manufactures of metal, railway material, etc., are on the free list. Detailed particulars may be had from the Customs authorities at Calcutta.

The industrial life of India in many instances is yet in its infancy when viewed through European spectacles, and already local industries represent cotton, jute, woollen, and paper mills, breweries and distilleries, coal mines, coffee works, flour, rice, oil, timber, and silk mills, tanneries, tile, sugar, and indigo factories, iron and brass foundries, arsenals, gun-carriage, cordite, army clothing, rifle, gun-cotton, gunpowder, and ammunition factories, dockyards, etc., to say nothing of wheat, rice, tea, tobacco, sugar, and other indigenous industries. With the expansion of these industries under modern control and according to the requirements of each locality, as no general principle holds good to the whole of India, owing to the enormous size of the Empire and various climatic and other conditions, then the building and allied trades will expand with the general expansion of the whole country. But it will be the British maker with his depôt established in India that will make progress, as he will be able to see locally, think locally, and act locally. Too much intelligence cannot be imported into Indian trading.

Many patentees in Britain are protecting their Indian rights, and the last annual record was 536 applications for inventions and designs at the Government office at Calcutta.

Large schemes and contracts are on hand at the moment, and many millions of pounds sterling will be spent during the next few years, and progressive manufacturers and exporters should follow up every rumour as to where an order is likely to lurk, and not forget that it is the man in India who buys.

ARCHITECTS AND ARTICLES SUPPLIED BY SPECIAL FIRMS.

SIR,—Why do architects specify that certain articles shall be supplied by special firms? The habit appears to be greatly on the increase, and it would be most interesting to hear the reasons for it. The disadvantages of the system are numerous, but are not perhaps thoroughly appreciated by the architects and their clients.

The final selection of the article should, of course, be at the discretion of the architect, but the builder should have the right to submit tenders from several firms in competition. The principal objection to the present system is that the merchant feels that he is independent of the builder, and has only to deal with the architect direct, and may, for example, occasionally go to him and suggest some variation without notifying the builder. The builder, on pointing out to the merchant that the work is not as specified, is informed that it has all been settled by the architect. This naturally causes annoyance and in certain cases inconvenience to the builder.

The builder has no chance to make favourable terms as regards mode and time of delivery, as the architect usually says nothing about this to the merchant when accepting his offer, and when once the offer is accepted it is most difficult to arrange any further conditions.

The builder is held responsible for the due and proper completion of the contract within the contract time, and it is making an already difficult task still more so, and in cases practically impossible, if the arrangements with the merchants are not left to the builder, as one of the most important points in the successful completion of a contract is to see that all materials are ordered well ahead and delivered as and when required.

Another point which should not be lost sight of is the cost of the work, which is of considerable importance in these times of keen competition.

In cases in which a special firm is specified it often happens that this firm only has been asked for a price, or at most one or two only are asked, whereas if the builder is at liberty to obtain prices from a number of firms the natural result is keener competition and consequently lower prices, which is to the benefit of all concerned.

We have been told before now by an architect when suggesting that other firms might quote that he knows the firm specified, and wants them to do the work, as they can do it well and have taken a lot of trouble over the matter, and so on; but it seems hardly fair either to the client, who wants his work done at the lowest cost consistent with good work, or to the builder, who has himself to go into competition to obtain the contract.

A LONDON BUILDER.

ESTIMATING FOR EXCAVATION AND CONCRETE WORK.

SIR,—I should like to point out that in Mr. Dix's letter under this heading in your issue of September 22, replying to the article of September 15, he has missed one of my points, which was not perhaps quite clear.

I stated that the bulk occupied by the cement disappeared on mixing with the ballast, thus 6 yds. of ballast and 1 yd. of cement make 6 yds. of dry mixture, and, further, that this 6 yds. of dry mixture shrank 15 per cent. (average) on wetting and depositing. In other words, the total loss is

	Per Cent.
Loss of cement + Shrinkage, 15 per cent.	= 14 = 15
Total loss	29 per cent.

which agrees very well with the figure 32 per cent. which Mr. Dix gives as his experience of the shrinkage in the latter part of his letter.

As regards my figure for labour and water, this was for 1 yd. of dry materials, so that the 15 per cent. has also to be added to this item, which, by the way, includes for use of all plant, water-pipes, etc.

Working out the same example in Mr. Dix's way, with his shrinkage figures, we should have—

		s.	d.
6 yds. cub. ballast	=	36	0
1 yds. cub. cement	=	32	11
		68	11
Shrinkage, 32 per cent.	=	22	7
	7)	91	6
		13	1
Labour 1s. 6d. + 15 per cent. =		1	9
		14	10
Profit, 10 per cent.		1	6
Total		16	4 per yd. cub.

which agrees with my figure, viz., 16s. 5d. I might, perhaps, add that the item 10 per cent. profit includes, say, 5 per cent. for establishment charges and superintendence.

THE WRITER OF THE ARTICLE.

Engineering Societies.

THE JUNIOR INSTITUTION OF ENGINEERS.—A party of members of this Institution, approaching 100 in number, availed themselves of the invitation given by the Associated Portland Cement Manufacturers to visit their Northfleet works on Saturday afternnon, the 22nd inst. Divided into small groups, they were shown round by Mr. H. K. G. Bamber, one of the managing directors and members of the staff. All the processes in the manufacture of Portland cement by the most modern methods were seen in operation, including the amalgamation of the raw materials, chalk, and clay, the slurry-mixing, the treatment in the rotary kiln, in the cooling cylinder, and the pulverising cylinders, the final product coming out in the form of very fine powder. Electrical power is largely employed at the works, and considerable extensions are being made.

WESLEYAN CHURCH, BARNES.—This building, with accommodation for 730 persons, was opened last week, the ceremony being performed by Mrs. Last, of Woking. The structure occupies a commanding site in the Station-road, and is built of pressed brick with Bath stone dressings and tracery windows. The contract has been carried out by Messrs. T. J. Messon & Sons, of Twickenham, from designs by Messrs. W. J. Morley & Sons, London and Bradford.

WEIGHTS AND MEASURES OFFICE, CITY OF LONDON.—The new buildings at No. 18, Whitecross-street, E.C., were opened on September 19 by the Lord Mayor and Sheriffs in State. They were erected, instead of the temporary premises at No. 42, Whitecross-street, by Messrs. Johnson & Co., who tendered for 6,194*l.*, after plans and designs prepared by Mr. Sydney Perks, City Surveyor. The building is in the Renaissance style, freely treated, and executed in red brick and plaster, dead-white in colour, finished quite smooth. The ground floor is allotted to the sand-blast machine for stamping tested glass measures and to appliances for testing heavy weighing instruments. The second and third floors are reserved for the processes of testing, sealing, and stamping weights, weighing machines, and measures, and for the chief inspector's and assistant inspectors' offices. Motive power for driving the machinery is installed in the basement, and offices are provided for the shop-hours and the petroleum and explosives inspectors. All the appliances, together with the 15-ton weigh-bridge, embody the newest and best approved types of apparatus.

Correspondence.

ST. PANCRAS LIBRARY COMPETITION.

SIR,—By an error on the part of the publishers of "British Competitions," a design of ours, submitted for the St. Pancras Library, has been described as being by Messrs. Wimperis & Best, while their design has been described as being ours.

We should be obliged if you would kindly insert this letter in your next issue.

WILLS & ANDERSON.

BOOKS RECEIVED.

EMBROIDERY AND TAPESTRY WEAVING. By Mrs. Archibald H. Christie. (John Hogg.)

A MANUAL OF HISTORIC ORNAMENT. By Richard Glazier. Second Edition. (B. T. Batsford. 6s.)

COMPULSORY TAKING OF LAND (Wilson's "Legal Handy Books"). By Thomas Waghorn. (Effingham Wilson. 2s.)

RANGE AND STOVE FIXING AND OVEN BUILDING. (Cassell & Co. 6d.)

PAPERHANGERS' WORK. (Cassell & Co. 6d.)

BRICKS AND BRICKMAKING. (Cassell & Co. 6d.)

A GLOSSARY OF ENGLISH ARCHITECTURE. By T. D. Atkinson. (Methuen & Co. 3s. 6d.)

Illustrations.

PROPOSED NEW BUILDINGS, MERRION-STREET, DUBLIN.

THE illustration, which is reproduced from the large drawing exhibited in this year's Royal Academy, shows the interior of the quadrangle, and the front towards Merrion-street, of the combined College of Science and Government Offices now being erected in Dublin from the designs of Sir Aston Webb and Mr. T. M. Deane; at least, one half of it is being erected, as shown and stated on the plan.

It was a happy idea to blend the two departments into one architectural scheme, thereby securing a finer and more imposing building than either of them could have been if treated separately.

In our issue of October 13, a fortnight hence, we shall be able to illustrate the drawing of the cupola and portico towards the quadrangle, on a larger scale, which was also exhibited at the Royal Academy.

HOLLOWAY SANATORIUM: PROPOSED MALE INFIRMARY.

THIS building has been designed to meet the requirements for special accommodation for sick and paralysed male patients. The site is detached, but close to the main building. The idea is that the building shall be self-contained, having its own kitchen and administration, and quarters for one of the medical staff. There are three distinct classes of patients to be housed in it, namely, (1) sick male patients, (2) sick male attendants, and (3) general paralytics. Spacious airing grounds are provided in front of the infirmary. The materials are local red bricks and tiles, Portland stone copings, etc., and teak joinery. The estimated cost, including engineering work, lighting, etc., is about 12,000*l.* The architect is Mr. R. Weir Schultz, 14, Gray's Inn-square, W.C., and the consulting engineer is Mr. W. H. Massey, Twyford, Berks.

STATION-STREET BUILDINGS, HUDDERSFIELD.

THESE buildings have been erected in a prominent position in Huddersfield by Mr. T. Brook, contractor, of Huddersfield. The elevations are faced with York stone, and all floors are fireproof. Messrs. Abbey & Hanson, surveyors, Huddersfield, prepared the working drawings from the design of Mr. J. Hatchard Smith, of London, who periodically visited the work during progress.

PROPOSED COLUMBARIUM FOR THE BOROUGH COUNCIL OF HAMPSTEAD.

THE illustration is reproduced from the selected design of Mr. J. J. S. Naylor, architect, of London, and is the result of the open competition which was held in 1904.

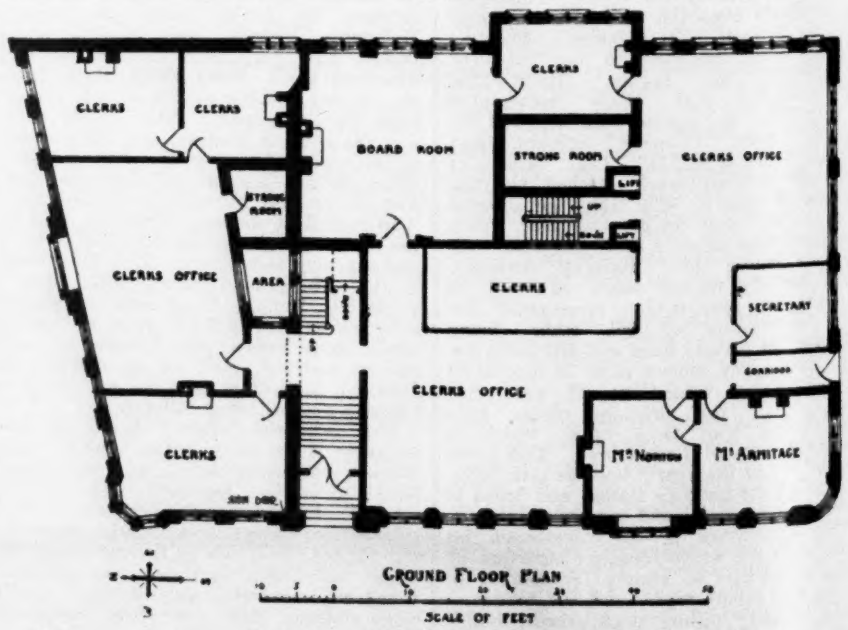
The building includes the columbarium, with its ornamental internal structures of marble for the storage of cinerary urns, and the mortuary in the rear. The centre structure, of white statuary and Sienna marbles, contains accommodation for 136 urns, and the Portland stone wall niches contain accommodation for 394 urns, the total accommodation being 530 urns.

The facings of the building and portico are to be of brown Whitbed Portland stone, the dome being constructed of reinforced concrete covered with copper, the lights in the dome of ½-in. hammered plate in copper frames.

The doors are to be formed of wainscot oak.

The lowest estimate amounted to 2,200*l.*, including quantity surveyor's fees and lithography.

FACTORY, KINLOCHLEVEN, N.B.—The necessary engineering work is in progress for providing the water power for the working of a large factory, to be built at Kinlochleven. Drawings have been prepared by Messrs. W. J. Morley & Son, of London and Bradford, for this factory and for the various other buildings that will be required. These include workmen's cottages, blocks of flats, barracks for single men, institute and baths, schools, and sundry other larger houses for the accommodation of the staff. Forty dwellings and one block of barracks for fifty-two men are now being proceeded with, and the factory will be started shortly. The contractors for the work in hand are Messrs. McLaughlin & Harvey, of Belfast and London.



Station-street Buildings, Huddersfield

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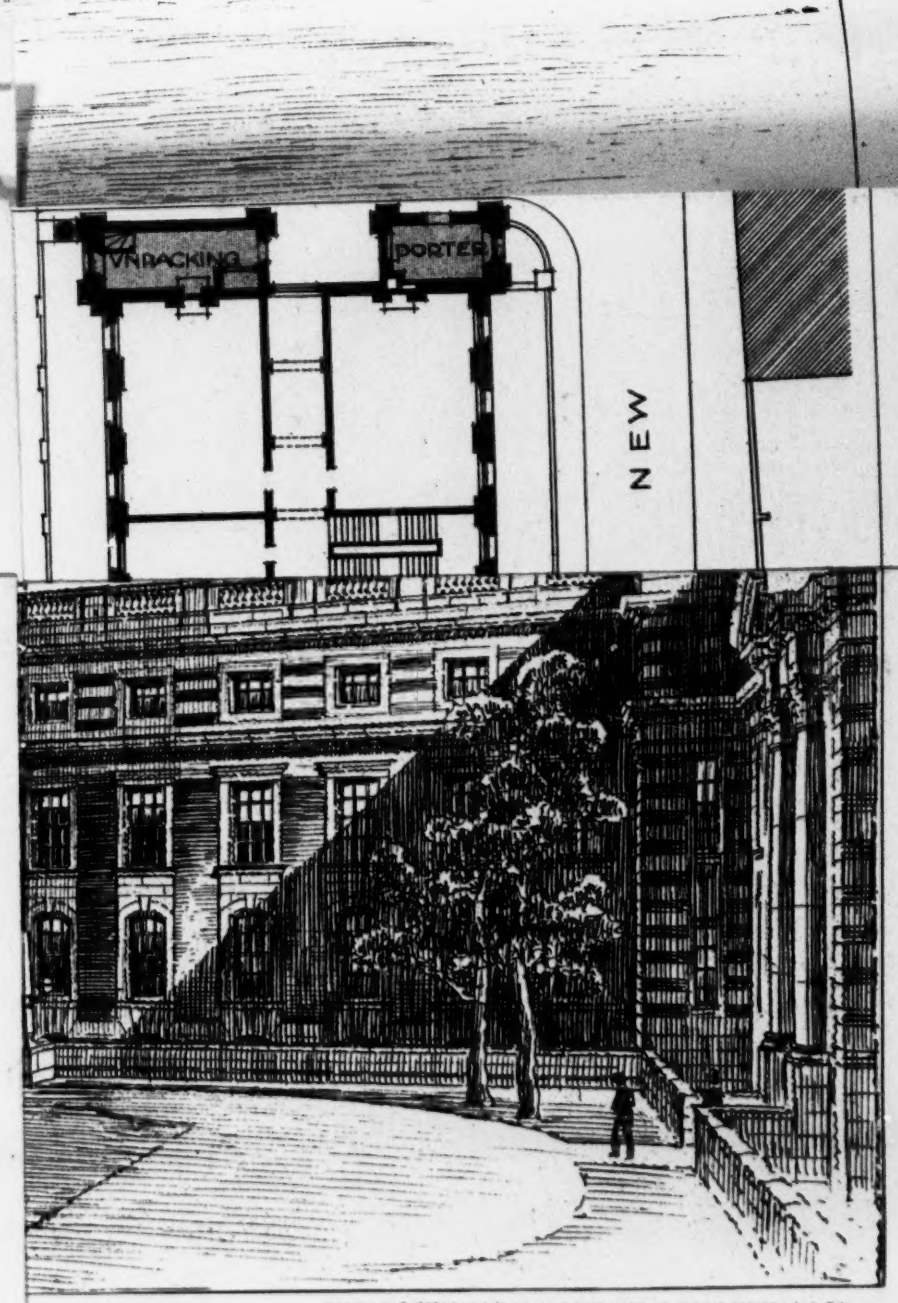

PHOTO LITHO. SPRAGUE & Co LTD 4 & 5 EAST HARDING STREET FETTER LANE, E.C.

AND GOVERNMENT OFFICES.

LANEWAY
(DARK TINT SHOWS BUILDING IN COURSE OF ERECTION)
ORGANIC LABORY
ADVANCED LABORATORY (MINERAL ANALYS)
REGIST.
LECTURE THEATRE
PREPARATION
LABORATORIES
PHYSICS CHEMISTRY
LECTURE
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CORRIDOR
CORRIDOR
SPECTROSCOPY
DARK
DARK
PREPARATION
SEALED TUBES

MERRION STREET UPPER

FEET

NEW ROAD

MERRION PLACE

NATIONAL HISTORIC MONUMENTS

OFFICES

OFFICES

PORTER

UNPACKING

UNPACKING

PORTER

LIGHT

RESEARCH

RESEARCH

RESEARCH

RESEARCH

PHOTOGRAPHY

DARK

DARK

METALLURGY

ELECTROLYTIC

ORGANIC

WATER & GAS

SEALED TUBES

CORRIDOR

BALANCES

GENERAL ● CHEMICAL

LABY

MERRION

PLACE

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OFFICES

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GENERAL & CHEMICAL LABY.

ORGANIC LABORY.

ADVANCED LABORATORY (MINERAL ANALYS.)

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DARK

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METALLURGY

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ORGANIC

WATER & GAS

SEALED TUBES

PREPARATION

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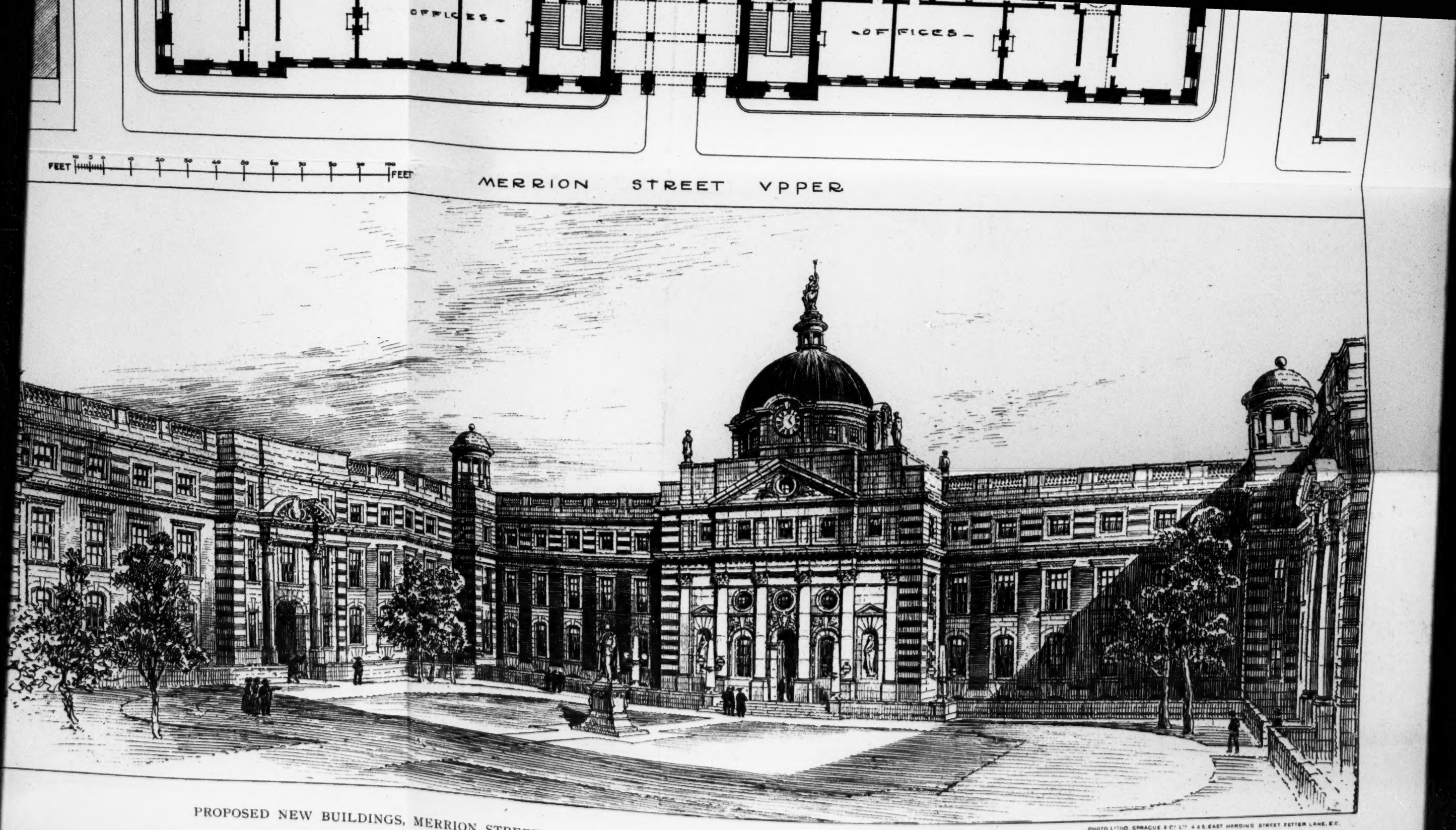
LANEWAY

(DARK TINT SHOWS BUILDING IN COURSE OF ERECTION)

NEW

ROAD

NATURAL HISTORY MUSEUM



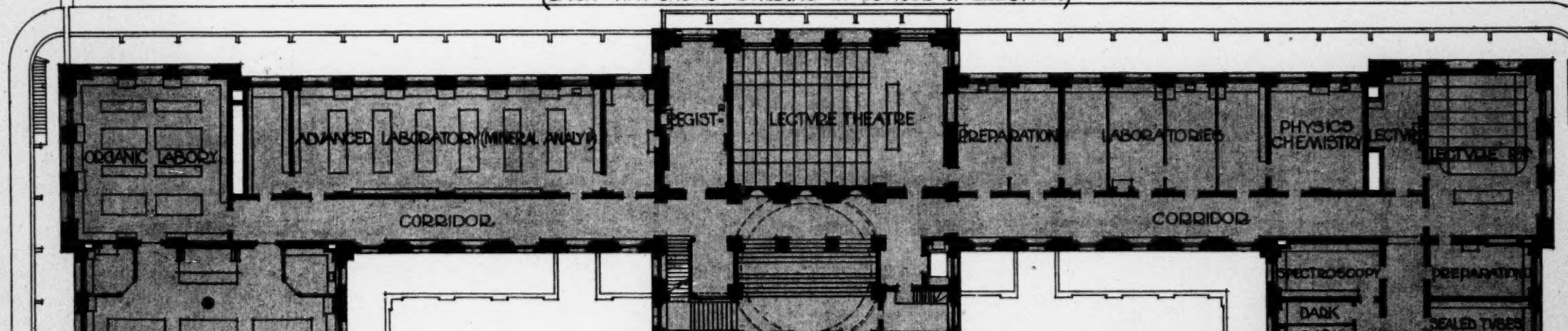
PROPOSED NEW BUILDINGS, MERRION STREET, DUBLIN, FOR THE ROYAL COLLEGE OF SCIENCE AND GOVERNMENT OFFICES.

Sir Aston Webb, R.A., and Mr. T. M. Deane, Joint Architects.

PHOTO LITHO. SPRAGUE & Co LTD 4 & 5 EAST HARDING STREET FETTER LANE, E.C.

LANEWAY

(DARK TINT SHOWS BUILDING IN COURSE OF ERECTION)



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SEALED TUBES

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PHOTOGRAPHY

DARK

DARK

BALANCES

GENERAL ● CHEMICAL

LABY

MERRION PLACE

TENEMENT HOUSES

TENEMENT HOUSES

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MERRION

ORGANIC LABORY

ADVANCED LABORATORY (MINERAL ANALYS)

REGIST.

LECTURE THEATRE

PREPARATION

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MERRION STREET VPPER

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MERRION STREET VPPER

PHOTO LITHO SPRAGUE & Co LTD

PROPOSED NEW BUILDINGS, MERRION STREET, DUBLIN, FOR THE ROYAL COLLEGE OF SCIENCE AND GOVERNMENT OFFICES.

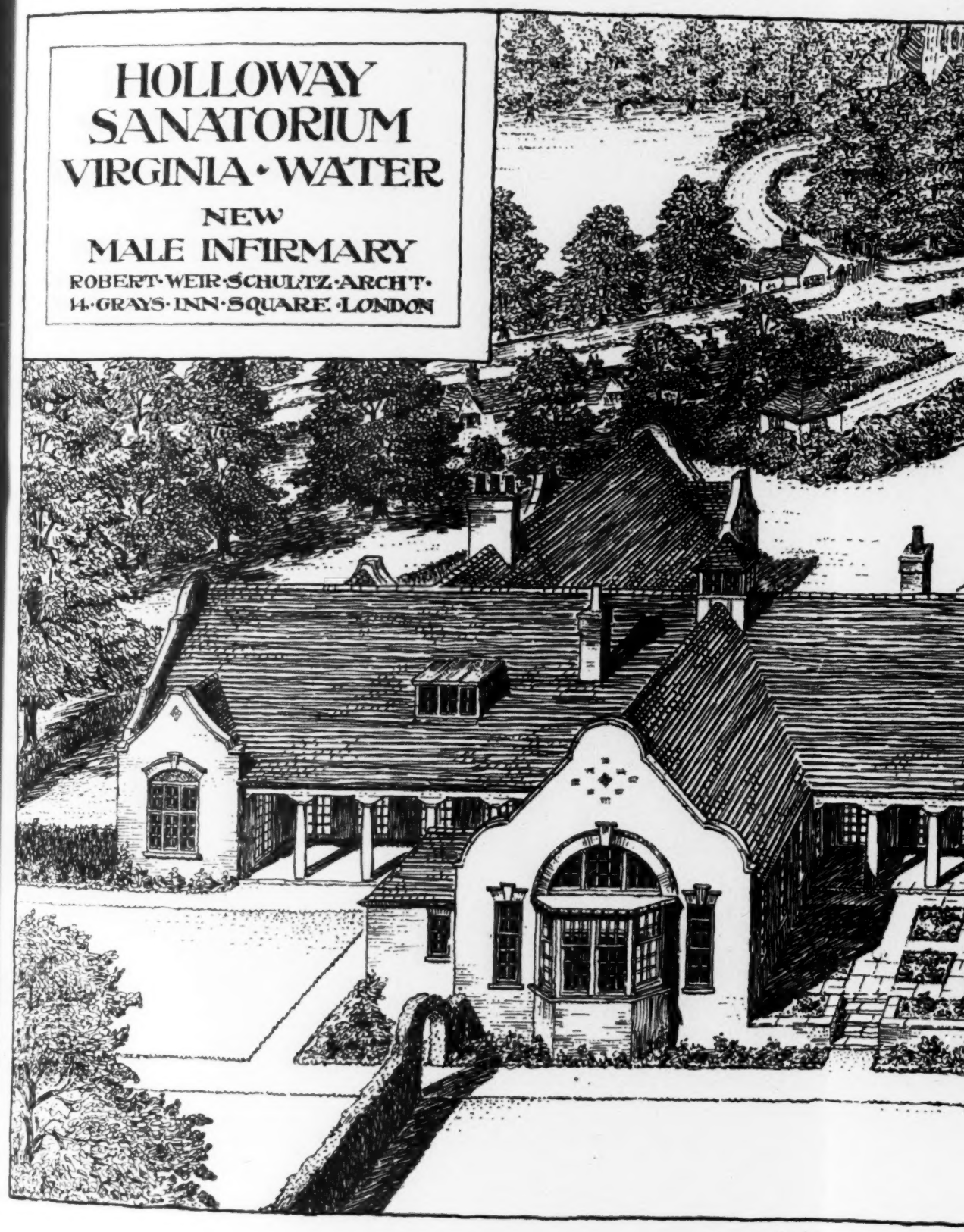
SIR ASTON WEBB, R.A., AND MR. T. M. DEANE, JOINT ARCHITECTS.

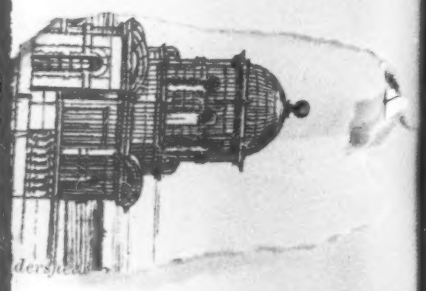
HOLLOWAY SANATORIUM VIRGINIA · WATER

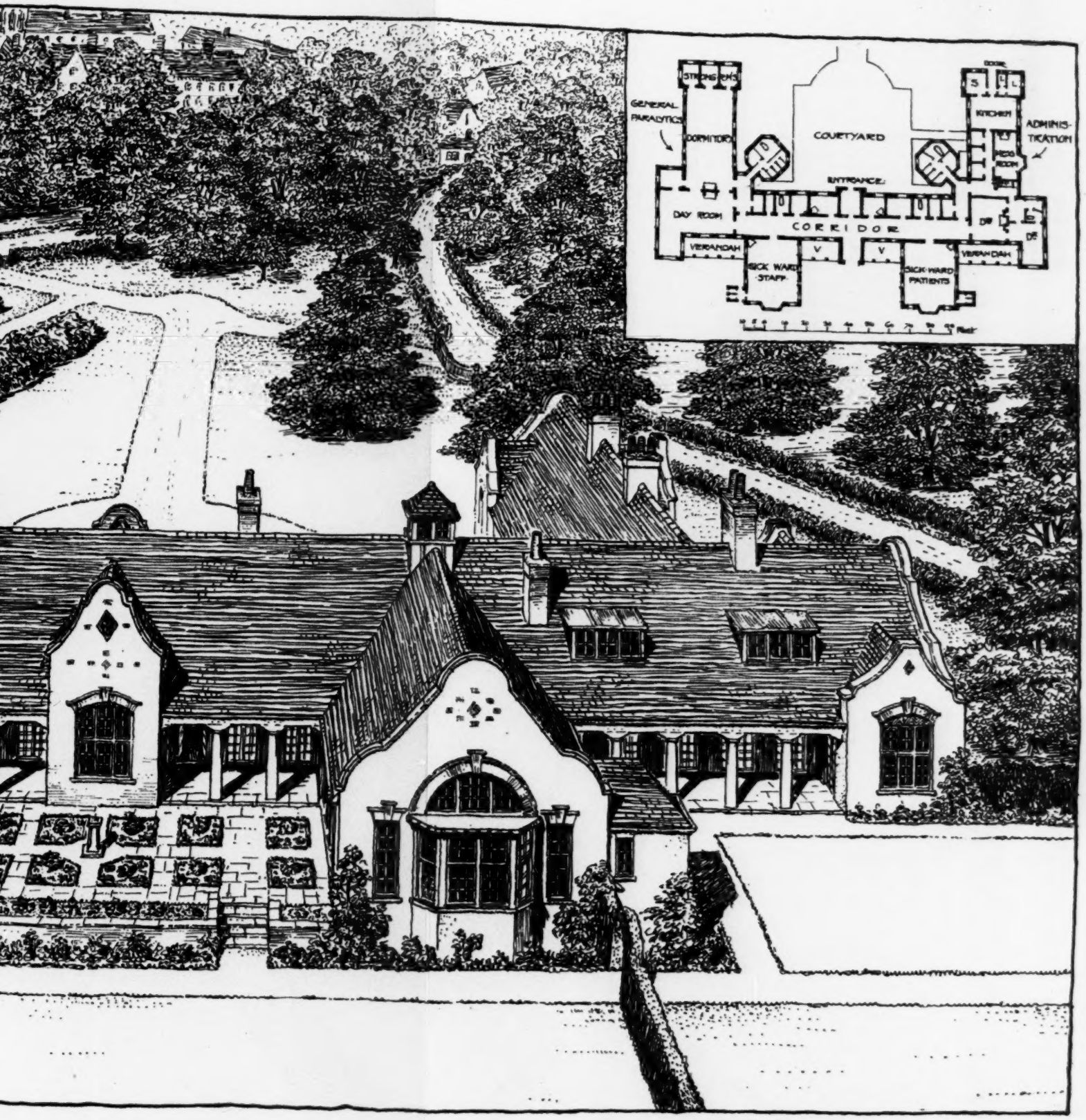
NEW

MALE INFIRMARY

ROBERT · WEIR · SCHULTZ · ARCH T ·
14 · GRAYS · INN · SQUARE · LONDON







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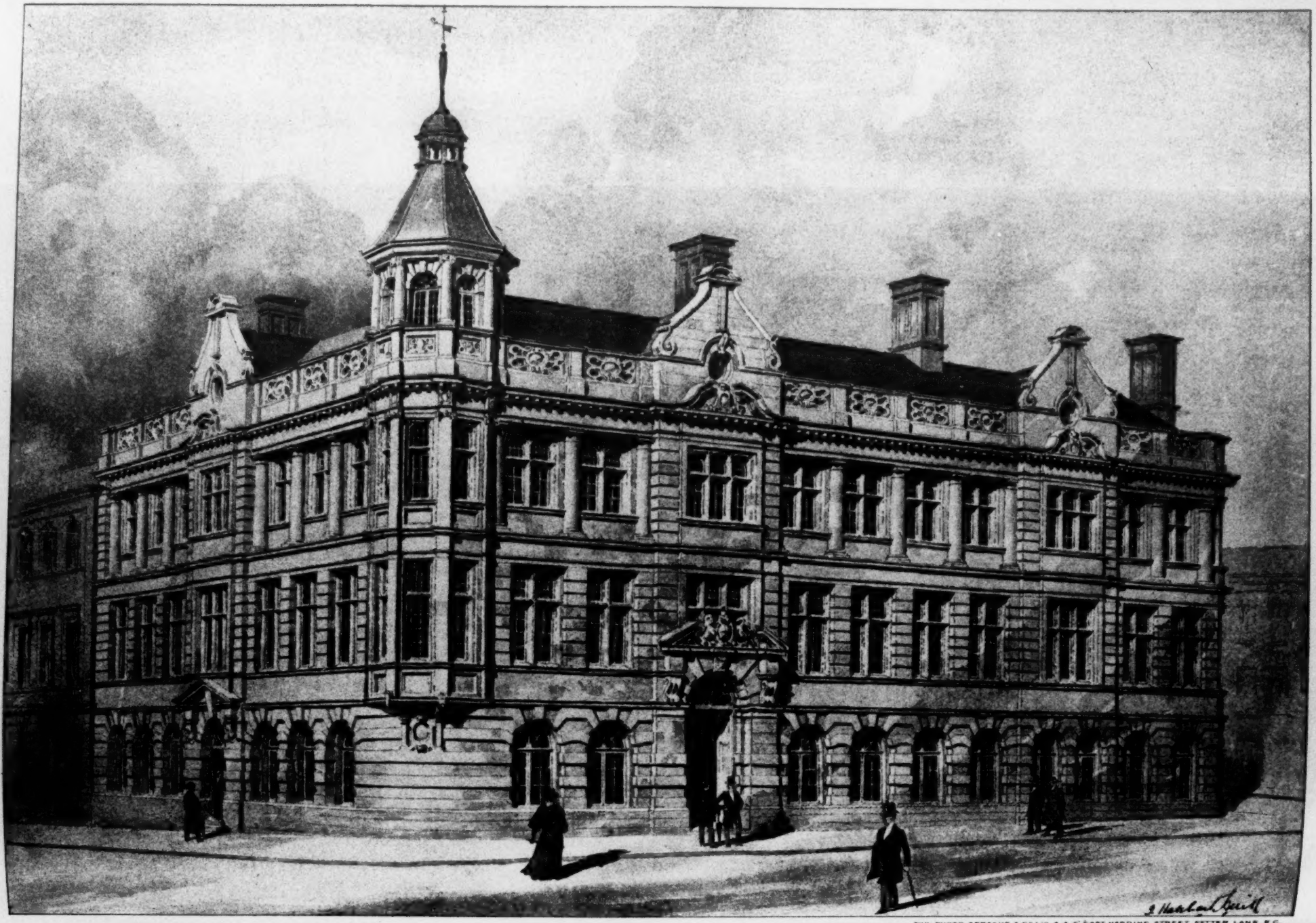


STATION STREET BUILDINGS, [illegible]

INK PHOTO. SPRAGUE & Co. LTD. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

COLUMBARIUM for the
BOROUGH of HAMPSTEAD

STATION STREET BUILDINGS

THE PHOTO. SPRAGUE & C°LTD 4 & 5 EAST HARDING STREET FETTER LANE E.C.

COLVMBARIVM of the
BOROVGH OF HAMPSTEAD
NW

Marble
Casket
Portico

PLAN

19 Hanover Sq

INK PHOTO. SPRAGUE & C°LTD 4 & 5 EAST HARDING STREET FETTER LANE E.C.

The Student's Column.

ROOFS: STRUCTURALLY CONSIDERED.—XI.

18.—Details of Simple Timber Roof Frames.

IN the most simple form of *lean-to* roof suitable for a shed of small span the only members of the framing are rafters built into one wall at intervals of from 12 in. to 15 in. apart, and resting upon the other wall (see Fig. 101). Where such an arrangement is adopted the rafters do not constitute a *frame*, except when boarding is nailed upon them as a basis for the roof covering.

A more workmanlike method of construction is to notch the end of the rafters upon *wall plates*, securing them in position by nails. The rafters may be built into the brickwork at the upper end or simply nailed in place on the wall plate.

Fig. 102 shows two wall plates built into the brickwork, the upper end of the rafter being built into the wall and notched upon one plate and the lower end notched upon the other.

Fig. 103 shows the upper wall plate placed on a corbel and the lower wall plate laid in the top course of brickwork. The upper end of the rafter butting against the face of the wall is notched upon the wall plate, which should be bolted through the brickwork. The lower end of the rafter is notched upon the other wall plate and fixed by nails.

In the elementary form of construction mentioned above the gutter can either be dispensed with or attached to the ends of the rafters by nails or screws.

A lean-to roof of wider span may require the addition of a tie-beam, making the construction similar to that represented in Fig. 104. Here the upper end of the rafter is notched upon a wall plate let into the wall, and the lower end is secured to the tie-beam by an oblique tenon-joint, shown in detail by Fig. 105. The tie-beam is built into the brickwork upon a wall plate. If the front wall is carried above the lower edge of the roof to form a parapet, as shown in Fig. 104, it becomes necessary to employ a type of gutter differing from that suited to a roof projecting over the front wall.

Two alternative methods of guttering for a roof with parapet wall are illustrated in Figs. 106 and 107. In Fig. 106 the gutter consists of a strip of zinc or lead shaped to fit the angle between the inner surface of the brickwork and the upper surface of the roof, and carried up to a sufficient height at either side. In Fig. 107 bridging pieces are fixed at suitable intervals, being supported by a strut at one end and the rafter at the other. These supports are connected by longitudinal strips of timber carrying a zinc or lead gutter as shown.

For lean-to roofs of still wider span the framework consists of triangular trusses, usually spaced about 10 ft. apart, and connected by *purlins*, supporting *common rafters*, spaced from 12 in. to 15 in. apart, on which the roof covering is laid.

As will be seen by reference to Fig. 108, a roof truss of the kind now under consideration resembles half a king-post truss in appearance. The tie-beam is fixed in the manner previously illustrated; upon it, and secured by a *joggle* or *stub-tenon* to prevent lateral displacement, is a king-post. At the upper end of the post a fillet is attached against the bevelled edge of which butts the upper end of the principal rafter, the lower end of the same member being jointed into the tie-beam by an oblique tenon.

For the purpose of affording intermediate support for the principal rafter the diagonal strut is jointed to the under side of that member by an oblique tenon, and the foot of the strut is tenoned into the inclined shoulder of the king-post.

The *purlin* is a beam running longitudinally from truss to truss bracing the construction and affording intermediate support for the common rafters. The purlin is notched upon the upper face of the principal rafters and into the lower face of the common rafters, as shown in Fig. 109. The purlin receives further support from the cleat *housed* into or simply nailed upon the principal rafter.

The common rafters are let into the wall at the upper end, and nailed to the tie-beam at the lower end. A better method of construction would be to provide a *pole-plate* connecting the outer ends of the tie-beams as usual in the case of king-post and other roofs.

In the most simple form of *couple roof*, Fig. 110, the rafters rest upon wall plates at the foot, being secured by nailing, and at the top are butted together and nailed, or crossed and nailed.

Improvements which can be effected at merely nominal cost are illustrated in Fig. 111, where the rafter shown is notched over the wall plate and projects beyond the front of the wall for the better discharge of rain, and a *ridge board* is added between the rafters.

In the *tied couple* roof (Fig. 112) the rafters abut at the upper end against and are nailed to a ridge-board, and at the lower end are securely nailed to the tie-beam, which is notched upon the wall plates. Timber is generally more convenient than a wrought-iron or steel tie for connecting the rafters, because of its suitability for the addition of a ceiling.

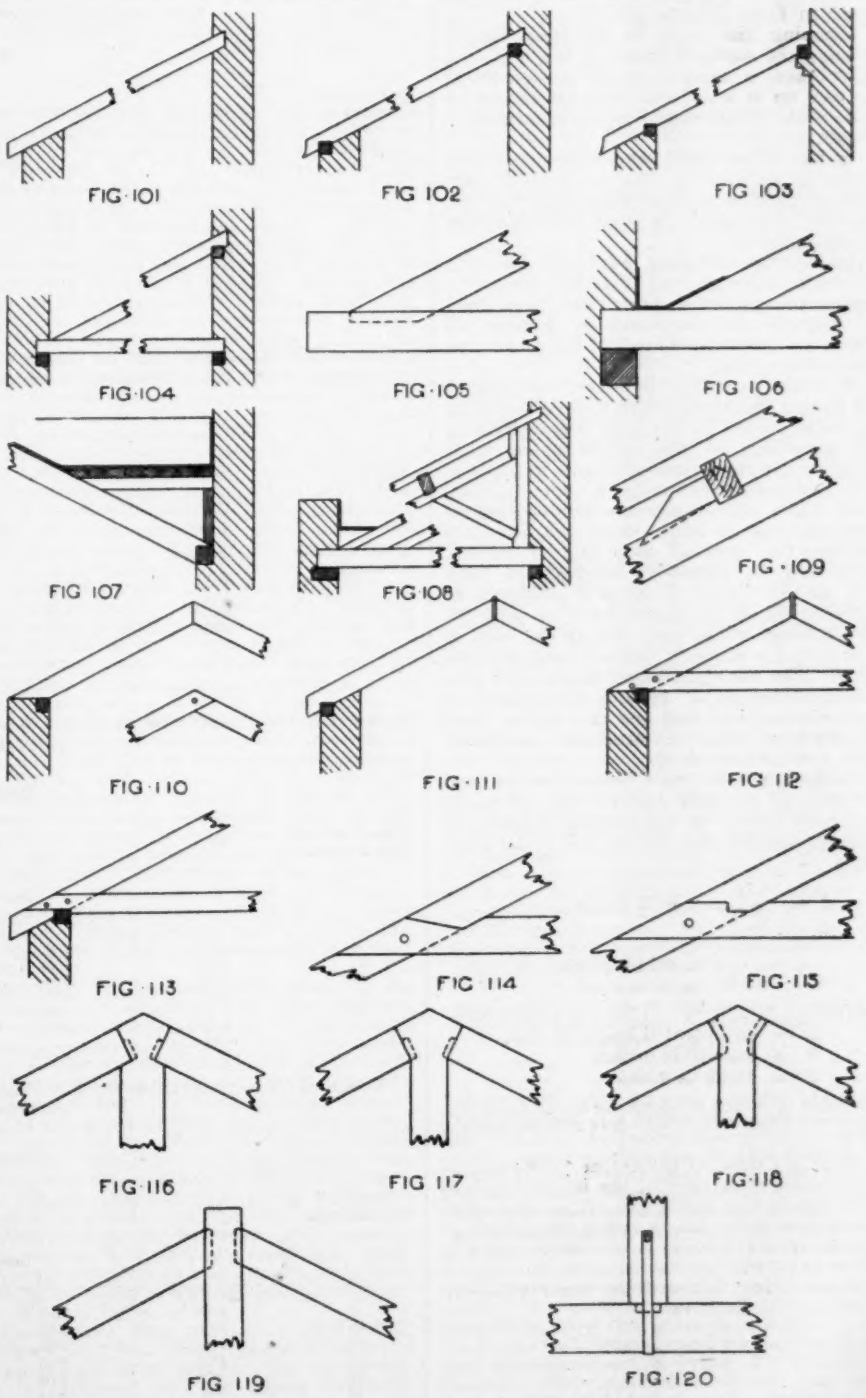
A preferable mode of construction for the tied-couple truss is shown in Fig. 113, where the rafters are extended so as to overhang the walls, thereby providing more adequately for the discharge of rain water from the roof covering.

The method of jointing the tie-beam with the rafters, as illustrated in the two preceding sketches, is open to the serious objection that the only resistance to tensile strain is afforded by the nails driven through the timbers. For the purpose of increasing the rigidity and security of the construction the members should be connected by some suitable form of joint. Fig. 114 represents an ordinary *dove-tail notch*, where the rafter is cut out sufficiently to afford a bearing for the tie; the latter is correspondingly notched, and the joint completed by a stout pin. It will be observed that the lower side of the joint is cut straight and the upper side at an angle.

The objection to any joint of this kind is that the shrinkage of timber across the grain is greater than that longitudinally with the grain. Hence a tie-beam so connected must tend to draw out after a time. Further, the joint is structurally weak at the angle formed by the upper line of the notch.

An improved type of notch similar to that recommended by Tredgold is shown in Fig. 115, but this is obviously less suitable for rafters and tie-beams than for joints where the timbers are at right angles to each other.

We next take up the case of a *tied-couple* with the addition of a king-post. In small span roofs with common rafters the head of



Illustrations to Student's Column.

the king-post is sometimes shaped to follow the inclination of the roof. Then to obviate unduly weakening the head of the post, as would be the case if joints were adopted like those in Fig. 116, one of the arrangements illustrated in Figs. 117 and 118 may be applied with advantage. In one case the tenon extends only about halfway along the joint so that the upper side of the mortise may form a strong check above the tenon. In the other case the tenon can be carried entirely along the joint, whose angular form provides against upward displacement.

A less costly and in every way preferable alternative is to let the king-post project as a ridge above the rafters, which are tenoned into the post indicated in Fig. 119.

In a simple roof of the kind now under consideration the king-post may be connected for suspension of the tie-beam by a notched joint, as already described and illustrated, or the post can be joggled into the tie-beam and the joint completed by the addition of an iron suspension strap, as in Fig. 120.

The addition of diagonal struts, by which the construction is developed into a complete king-post truss, is scarcely necessary for small and simple roofs such as form the subject of the present notes. The details of king-post trusses will be taken up in a succeeding article.

In a collar-beam roof the horizontal member should be fixed by means of a notched joint similar to either of those illustrated in Figs. 114 and 115.

Assuming the walls to be incapable of resisting the outward thrust of the roof, the collar-beam is usually placed one-fourth of the way up as a tie, and the joint should be made with special regard to the resistance of tension.

On the other hand, where the horizontal thrust is resisted by the walls the collar-beam is fixed as a strut about half-way up, and the joints should be made with shoulders of ample depth.

Among the foregoing examples we have illustrated only one roof (Fig. 108) where the trusses are applied as principals, being fixed at intervals and connected by purlins, on which common rafters are laid for supporting the roof covering.

It should be stated, however, that any of the trusses described which include tie-beams can be employed in the same way, providing the scantlings of the members are made adequate for the increased strains involved.

A further point worthy of note is that, even where the trusses are not applied as principals, a tie-beam need not be fixed between the ends of each pair of rafters. They may be placed at intervals of from 5 ft. to 10 ft. apart if the wall plates are of sufficient width to enable them to take the thrust between the ties, and if the foot of each rafter is properly notched upon the wall plate. The use of tie-beams in the way here indicated results in an economical form of roof construction, and one that is far more satisfactory from the structural standpoint than a collar-beam roof.

Tredgold's rule given below for the proportions of common rafters will be found generally useful in calculations relative to lean-to, couple, tied-couple, and collar-beam roofs :—

$$d = \frac{L}{\sqrt[3]{b}} \times 0{\cdot}72 \text{ for fir}$$

$$= \frac{L}{\sqrt[3]{b}} \times 0{\cdot}74 \text{ for oak} \quad . \quad . \quad (5)$$

where

L = unsupported length in feet,
b = breadth in inches,
d = depth in inches.

Example (1).—Find the depth for a deal rafter, 2 in. thick, in a couple-roof of 12 ft. span with the pitch of 26° 33′.

Here the slope of the rafter represents the hypotenuse of a triangle, the length of whose base equals half the length of the roof span. Consequently by trigonometry the length of the rafter is $(12 \div 2) \div \cos 26° 33' = 6 \div 0{\cdot}895 = 6{\cdot}7$ ft.

Substituting this and the other values in formula (5), we have

$$d = \frac{6{\cdot}7}{\sqrt[3]{2}} \times 0{\cdot}72$$

$$= 5{\cdot}32 \times 0{\cdot}72 = 3{\cdot}83 \text{ in.}$$

The rule can be simplified for application to the usual thickness of 2 in. adopted for common rafters as follows :—

$$\frac{L}{\sqrt[3]{2}} \times 0{\cdot}72 = L \times \frac{0{\cdot}72}{1{\cdot}26}$$

whence

$$d = L \times 0{\cdot}571 \quad . \quad . \quad . \quad . \quad . \quad (5a)$$

Tables XXII. and XXIII., giving the dimensions of common rafters for various thicknesses and unsupported lengths, has been calculated by formula (5). The depths are stated in decimals, so that the calculated gradation of dimensions may be more clearly seen.

The proportions of collar-beams at any height above the level of the wall plate can be calculated by the rule

$$d = \frac{L^1}{\sqrt[3]{b}} \times 0{\cdot}72 \quad . \quad . \quad . \quad . \quad . \quad (6)$$

where L^1 = the clear length of the under side of the collar-beam.

Example (2).—Find the depth of a collar-beam 2 in. thick placed one quarter of the way up a roof with the span of 12 ft.

Here $L^1 = 9$ ft., and $b = 2$ in.

Substituting these values in formula (6) we have

$$d = \frac{9}{\sqrt[3]{2}} \times 0{\cdot}72$$

$$= 5{\cdot}14 \text{ in., say, } 5\tfrac{1}{4} \text{ in.}$$

Example (3).—Find the depth of a collar-beam 2 in. thick placed half way up a roof with the span of 12 ft.

Here $L^1 = 6$ ft. Substituting this value in formula (6) we have

$$d = \frac{6}{\sqrt[3]{2}} \times 0{\cdot}72$$

$$= 3{\cdot}42 \text{ in., say, } 3\tfrac{1}{2} \text{ in.}$$

Tables XXIV. and XXV. have been calculated by formula (6) for collar-beams of different thicknesses for roofs of various spans.

Tredgold's rule for tie-beams gives results that would be unnecessarily high for tied-couple roofs, even if the ties were applied at intervals of 10 ft. apart.

In its usual form the rule is

$$d = \frac{L}{\sqrt[3]{b}} \times 1{\cdot}47 \text{ for fir.}$$

$$= \frac{L}{\sqrt[3]{b}} \times 1{\cdot}52 \text{ for oak} \quad . \quad . \quad . \quad (7)$$

If modified by adopting 1·1 as the value for fir of the last factor, the dimensions thereby calculated will be found adequate for tie-beams spaced from 5 ft. to 10 ft. apart in light tied-couple roofs.

A point never to be overlooked is that due allowance must be made for loss of strength due to notched or other joints in roof timbers.

TABLE XXII.—SCANTLINGS OF COMMON RAFTERS IN FIR, OF VARIOUS WIDTHS AND UNSUPPORTED LENGTHS. (RAFTERS 12 IN. APART.)

Unsupported Length in Feet.	Width of Rafter in Inches.				
	1¾	2	2¼	2½	3
	Depth of Rafter in Inches.				
5	2·99	2·86	2·75	—	—
6	3·50	3·43	3·30	3·19	—
7	4·18	4·00	3·85	3·71	3·50
8	4·79	4·57	4·40	4·25	4·00
9	5·38	5·15	4·95	4·78	4·50
10	5·98	5·71	5·50	5·31	5·00

TABLE XXIII.—SCANTLINGS OF COMMON RAFTERS IN FIR FOR ROOFS OF VARIOUS SPANS: PITCH = 26° 33′. (RAFTERS 12 IN. APART AND WITHOUT INTERMEDIATE SUPPORT.)

Span of Roof in Feet.	Width of Rafters in Inches.				
	1¾	2	2¼	2½	3
	Depth of Rafters in Inches.				
8	2·67	2·55	2·45	—	—
10	3·35	3·20	3·12	2·96	—
12	4·00	3·82	3·68	3·55	3·35
14	4·68	4·46	4·30	4·15	3·91
16	5·35	5·10	4·92	4·75	4·46
18	6·34	6·05	5·82	5·65	5·29

TABLE XXIV.—SCANTLINGS OF FIR COLLARS (QUARTER-WAY UP) FOR COLLAR-BEAM ROOFS. (RAFTERS 12 IN. APART.)

Span of Roof in Feet.	Breadth of Collar-Beam in Inches.				
	1¾	2	2¼	2½	3
	Depth of Collar-Beam in Inches.				
8	3·58	3·42	3·30	3·18	2·95
10	4·48	4·28	4·12	3·93	3·75
12	5·37	5·14	4·95	4·78	4·50
14	6·27	6·00	5·77	5·57	5·25
16	7·17	6·85	6·60	6·37	6·00
18	8·06	7·70	7·42	7·17	6·75

TABLE XXV.—SCANTLINGS OF FIR COLLARS (HALF-WAY UP) FOR COLLAR-BEAM ROOFS. (RAFTERS 12 IN. APART.)

Span of Roof in Feet.	Breadth of Collar-Beam in Inches.				
	1¾	2	2¼	2½	3
	Depth of Collar-Beam in Inches.				
8	2·39	2·28	—	—	—
10	2·98	2·85	2·75	2·65	—
12	3·58	3·42	3·30	3·18	2·95
14	4·18	4·00	3·85	3·71	3·50
16	4·78	4·56	4·40	4·25	4·00
18	5·37	5·14	4·95	4·78	4·50

Tables XXVI. and XXVII. contain further particulars relative to couple and collar-beam roofs.

TABLE XXVI.—SCANTLINGS FOR COUPLE ROOFS IN FIR; RISE = ¼ SPAN, ROOF COVERED WITH SLATES LAID ON BOARDING.—(*Wray.*)

Span of Roof.	Rafters.	Ridge Board.	Ceiling Joists.
Feet.	Inches.	Inches.	Inches.
8	2 × 3	1¼ × 7	2 × 4
10	2 × 3½	1¼ × 7	2 × 5
12	2 × 4	1¼ × 7	2 × 6
14	2 × 4½	1¼ × 7	2 × 7
16	2 × 5	1¼ × 8	2 × 8
18	2 × 5½	1¼ × 8	2 × 9

TABLE XXVII.—SCANTLINGS FOR COLLAR-BEAM ROOFS IN FIR; PITCH UP TO 30°.—(*Wray.*)

Span of Roof.	Rafters.				Collars.	
	Thrust Taken by Walls or Ties. Compression Collar Half-way up.		Thrust Taken by Tension Collars Quarter-way up.		Quarter-way up.	
	No Ceiling.	With Ceiling.	No Ceiling.	With Ceiling.	No Ceiling.	With Ceiling.
Feet.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
8	1½ × 2½	1½ × 3	2½ × 3½	2½ × 3½	1½ × 2½	2 × 3½
10	1½ × 2½	1½ × 3	2½ × 4	2½ × 4½	2 × 2½	2 × 4½
12	1½ × 2½	1½ × 3½	2½ × 4½	2½ × 5	2 × 2½	2 × 5
14	1½ × 3	1½ × 3½	2½ × 5	2½ × 5½	2 × 3	2 × 5½
16	2 × 3½	2 × 3½	2½ × 5½	2½ × 6	2 × 3½	2 × 6½
18	2 × 3½	2 × 4½	2½ × 6	2½ × 9½	2 × 4	2 × 7½

General Building News.

NEW CHURCH, THORNHAM.—The foundation-stone of a new church at Thornham, near Middleton, was laid recently. It is intended to build chancel, nave, and vestries, at a cost of about 4,500*l.*, leaving the completion of the edifice to a future period. Mr. R. B. Preston, of Manchester, is the architect of the work.

FREE METHODIST CHURCH, STAPENHILL, BURTON-ON-TRENT.—A new Free Methodist church is being erected on a site in Hill-street, Stapenhill. It has been designed by Mr. T. Jenkins, architect, of Burton and Swadlincote.

R.C. CHURCH, TULLAMORE.—A new Catholic church is to be opened at Tullamore on October 7. From the outside eastern wall to the west door the church measures 172 ft., and consists of nave, 36 ft. wide, and side aisles, 18 ft. each in width. The sanctuary is of apsidal shape, having on either side two chapels. The vestry and tribune are both veiled off from the high altar by pitchpine perforated screens. Over the altars the groined roof is of consists of nave, 36 ft. wide, and side aisles, and the great centre roof over the nave consists of polished pitchpine panels. The clearstory windows and the window on the west end, as well as the windows on the side aisles, are glazed with cathedral glass, and were designed by Messrs. Clarke, church decorators, Dublin. In the west end of the church, on an octagon-shaped gallery, stands an organ, built by Messrs. Telford & Telford, Dublin. Messrs. Malone, of Dublin, executed the high altar. The plans were prepared by Mr. M'Namara, architect, of Dublin, and the estimated cost of the building, including the tower and spire, internal fittings and furniture, is about 25,000*l.*

CHURCH RESTORATION, WINFARTHING. — The work of restoring the parish church at Winfarthing has now been completed. The general contract has been carried out by Mr. W. H. Ludkin, of Banham; the stonemasonry by Mr. A. W. Perfitt, of Long Stratton; the glazing by Mr. T. Horth, of Norwich; and the re-casting of the lead by Mr. J. T. Gibson, of Norwich. All the work was executed under the supervision of Mr. Arthur J. Lacey, architect and Diocesan Surveyor, of Norwich.

WESLEYAN CHURCH, PENZANCE.—A new Wesleyan church is being erected on the Richmond estate, opposite Tolver-place, Penzance. The plans were prepared by Messrs. Gordon & Gunton, of London, and the contract was let to Mr. Edward Pidwell, of Penzance. The church will provide accommodation for 550 persons, and the scheme, it is estimated, will cost about 6,000*l.*

BAPTIST CHAPEL, HENGOED.—A new Baptist Chapel has been erected and will shortly be opened at Hengoed. The building is of native stone with rough cast face and Portland cement dressing. The heating is on the high-pressure system, and the apparatus was installed by Messrs. Baker, of Newport. The architect is Mr. George Kenshole, of Bargoed, Nelson, and Hengoed, and the builder is Mr. Richard Jones, of Maesycwmmer.

GRAMMAR SCHOOL, OSSETT.—The formal opening took place on the 24th inst. of a new grammar school at Ossett. The building, which is not new, but was previously a large private residence, known as the Park House, has been converted, at a total cost of about 5,000*l.*, into a secondary school, providing accommodation for 120 scholars. Mr. F. W. Ridgway, architect, prepared the plans for the work.

SECONDARY SCHOOL, DEVIZES.—A new secondary school has been erected and opened at Devizes. The main entrance of the school is in the centre of the front elevation of the main building, and leads through a porch and entrance lobby into the assembly-hall, with small rooms on either side (approached from the hall) for the head-master, assistant masters, assistant mistresses, and caretaker. The assembly-hall is 38 ft. 6 in. by 26 ft. 6 in., and has on either side a classroom, 24 ft. by 20 ft. 6 in., and at the end a classroom, 26 ft. 6 in. by 17 ft., separated from the assembly-hall by a folding partition. From the assembly-hall two stone staircases, one on each side of the building, lead to the first floor, each staircase having, leading out of its half-space landing, an annexe to be fitted with museum cupboards at a later period. The first floor accommodation consists of a classroom at the back, a lecture-room, and a laboratory and art-room on either side. The outbuilding on the boys' side consists of a manual instruction-room, and on the girls' side a cookery-room, each having a cloak-room adjoining. The building provides classroom accommodation according to the Board of Education's regulations for 125 pupils, without reckoning the laboratory, art-room, manual, and cookery rooms. The main building is faced with orange-coloured, sandy-faced Newbury bricks and Bath stone, and roofed with green slates. The ground floor is composed of pitch-pine wood blocks on concrete or granolithic, and the staircases and landings are of fireproof construction. The heating, which is by low-pressure hot-water, has been carried out by Messrs. Haden & Sons, of Trowbridge, who have also supplied the appliances for ventilation, by means of which warm, fresh air is supplied to the building, but, apart from this, fresh inlet air is supplied by means of Kite's brackets, and vitiated air is extracted by turret air-pumps connected by trunks with ceiling gratings. The gas fittings have been executed by Messrs. Gardiner, Sons, & Co., of Bristol; and Messrs. Mariner & West, of Bath—the latter having also executed the wrought-iron entrance gates, railings, etc. The architect of the school is Mr. R. E. Brinkworth, of Bath and Chippenham; the general contractors, Messrs. J. Long & Sons, of Bath; and the clerk of works, Mr. J. Mansfield. The cost of the work was about 6,000*l.*

BUILDING IN ABERDEEN.—The plans of the following new buildings have been approved of:—Seven dwelling-houses on the east side of Hammersmith-road, for Mr. John Milne, architect; reconstruction of premises on the west side of North Esplanade West, per Mr. Duncan Hodge, architect; two dwelling-houses on south side of new street leading from Wellington-road to Crown-street, per Messrs. Sutherland & Pirie, architects; alterations and additions in connexion with the premises, No. 220, Union-street, per Messrs. Sutherland & Pirie, architects; addition to premises on the north side of Commercial-road, for the Aberdeen Lime Company, Ltd., per Mr. A. T. M'Robert, manager; dwelling-house and shop on the east side of Gallowgate, at its junction with Littlejohn-street, per Mr. William Smith, architect.

FREE LIBRARY, BRIDGWATER.—On the 20th inst. the new Public Free Library and Reading-rooms at Bridgwater were opened. The new building is situated in the Blake Gardens, and was built from plans designed by Mr. E. Godfrey Page, of London, the contractor being Mr. Charles Bryer, jun., of Bridgwater. The rooms are grouped round the large hall, which is entered from a porch at the corner. The building is of Bridgwater bricks, covered with Bridgwater tiles, and has five varieties of local stone in its decoration; while the teak, of which all the joinery and furniture is made, comes from Burmah. The cost, about 3,500*l.*, has been defrayed by Mr. Andrew Carnegie.

NEWCASTLE CENTRAL STATION (PASSENGER TRAFFIC).—In a "Note" in our number of September 1 we adverted to the new goods station which the North-Eastern Railway Company have just erected in Newcastle-on-Tyne, after the designs of their chief architect, Mr. William Bell, of York. Mr. Bell is now carrying out some extensive alterations at the Central Station for that Company, to enable the traffic from King Edward Bridge to enter at the west end and to leave at the east end of the station, and *vice versâ*. The improvements comprise the building of new offices, the lengthening and widening of some of the platforms from the west end, and the construction of a new "island" platform extending beyond the present roof for the Carlisle and westward traffic. Mr. Charles A. Harrison, chief engineer for the northern division of the company's system, has made designs for the new permanent ways and junctions, as well as for the installation of the Westinghouse electro-pneumatic signalling, for which a new signal-box, fitted with 211 levers, has been built at the north approach of the new bridge. The contractors for the masonry work and for the roofing, etc., are Mr. Bolam, of Birtley, co. Durham, and the Clyde Structural Iron Company, of Scotstoun, Glasgow, respectively. It is stated that the signal-box is the largest in Great Britain in which pneumatic or electric power is employed.

TOWN HALL, SUTTON COLDFIELD.—The new Town Hall in King Edward-square, adjoining the existing Council-house, was opened on the 19th inst. The building contains a large assembly-room, reception or supper room, entrance and crush halls, with cloak-rooms and lavatories for both sexes, dressing-rooms, and a green-room have been provided in connexion with the platform, which is also convertible to stage purposes. The clock-tower acts as a ventilating shaft. The style adopted has been Georgian, to harmonise with the character of the town, the materials adopted being red local bricks and Monk's Park stone, with Kentmere slates for the roofs. The system of ventilation and warming adopted is the Plenum. The general contractor was Mr. T. Elvins, of Birmingham. The stone was supplied by the Bath Stone Firms, Ltd., the fibrous and other plastering was carried out by Messrs. Mallin & Co., of West Bromwich; the leaded glazing by Mr. A. J. Dix, of London; the wrought-iron work by Messrs. Keeling, Teale, & Co. of London; the locks, door and window furniture, springs, etc., by Messrs. Ramsay & Brothers, of Birmingham; the clock in tower by Messrs. Evans & Sons, of Birmingham; the stone-carving by Mr. Gilbert Seale, of London; the granolithic paving by Stuart's Granolithic Company, of London; the sanitary fittings by Messrs. Twyford, of Hanley; the heating and ventilating engineering by Messrs. Ashwell & Nesbit, of Leicester and London. The electric wiring has been carried out by Mr. Vaughton, of Birmingham; and the electric fittings by the General Electric Company, under the superintendence of Mr. Trevor Duesbury, the Borough Electrical Engineer. Mr. Arthur R. Mayston, of London, was the architect, and, as no clerk of works was employed, he was assisted in the superintendence by Mr. W. A. H. Clarry, the Borough Surveyor. The new fire-station, which really forms part of the building, was opened in November last.

Sanitary and Engineering News.

COMPLAINTS AS TO A LONDON COUNTY COUNCIL SEWER.—In a Report, issued on Saturday, the Public Health Committee of Kensington reported that the Medical Officer of Health had informed them of the receipt by him of numerous complaints of offensive smells from untrapped street gullies and surface ventilators, particularly those on the line of the new relief sewer of the London County Council serving the northern portion of the borough, which has become operative within the last month. One complaint, referring to effluvia proceeding from the sewer in question, took the form of a memorial signed by no less than sixty inhabitants of Cornwall-road and Clarendon-road. The Committee learned from the correspondence which had passed between the Medical Officer of Health and the Chief

Engineer of the London County Council that the sewer does not actually carry surface or house drainage until the water in the middle-level sewer rises to a height of 2 ft. 8 in. above the invert, but that during the recent dry weather it has been acting through a number of 2-in. circular openings as a ventilator to the middle-level sewer, and has thus apparently created a very serious nuisance throughout a considerable portion of its length. The Committee were given to understand that, as a result of representation made to the London County Council, all the surface ventilators of the sewer have been temporarily closed, as well as two ventilators on the middle-level sewer in Colville-terrace and Cornwall-road by Basing-road; but, inasmuch as the action taken is admittedly of a tentative character, the Committee had given directions for a communication to be addressed to the London County Council inquiring what steps it is proposed to take to effectually and permanently remedy the grave nuisance and danger to health to which attention had been called.

Stained Glass & Decoration.

MEMORIAL WINDOW, ALYTH.—A window has been placed in Alyth Parish Church to the memory of Mr. Willian Robertson, Alyth. It is the work of Mr. Stephen Adam, 188, Bath-street, Glasgow.

MEMORIAL WINDOW, ARBROATH.—A window was recently unveiled in High-street United Free Church, and dedicated to the memory of the late Rev. John Sandison, a former minister of the church. The window is 12 ft. by 3½ ft. It was designed by Mr. William Leiper, R.S.A., Glasgow.

Appointments.

INSTITUTE OF MINING ENGINEERS. — Mr. Maurice Deacon has been elected President for the session 1906-7, *vice* Sir Lees Knowles, retired.

RAILWAYS COMMISSION, AUSTRALIA.—The Australian Commissioners for Railways have nominated Mr. T. Roberts, Chief Mechanical Engineer to the Government, South Australia, as consulting mining engineer for the continent of Australia, with offices in London. Mr. Roberts has been latterly employed in the works at Crewe of the London and North-Western Railway, and had previously been in the service of the Metropolitan Railway Company, for whom he designed and erected much of their structural ironwork.

Foreign.

FRANCE.—M. Dujardin-Beaumetz, the Under-Secretary of State for Art, has ordered the restoration of the Abbey of St. Jean-des-Vignes at Soissons, which is in a ruinous condition. It is a fine example of XVIth century architecture, said to have been built by Jean-de-Fontaine, an ancestor of the author of the "Fables." The restoration is also to be undertaken of the church of St. Léger at Soissons; also of the church of Notre Dame-sur-l'Eau at Domfront, and of the ancient Château of the same city.——Important works have been undertaken for the restoration of the cathedral of Bourges, in the course of which traces have been found of the first building of the XIIIth century, also the sarcophagus of a bishop, containing various ecclesiastical ornaments, which have been placed in the museum at Bourges. ——The Municipality of Beziers have opened a competition for the construction of artisans' dwellings. The awards will be made at the end of next month.——The President of the Republic inaugurated last Sunday, at Marseilles, a monument to Pierre Puget. It is placed in the Square de la Bourse, and is the work of M. Henry Lombard, a Marseilles sculptor and a former Prix de Rome.—— Next month the Académie des Beaux-Arts will proceed to the election of a successor to Jules Breton. Among the candidates are MM. Gervex, Chartran, Raphaël Collin, Tony Robert-Fleury, and Gabriel Ferrier.——The Société Nationale des Architectes Français has chosen, for the subject of its fifth annual competition, "A Railway Terminus."—M. Léon Guérin has left a legacy to the Ecole des Beaux-Arts for founding an annual prize for students who have gained distinction in the architectural school.——The Pont Notre Dame at Paris is to be rebuilt shortly; the stone arches will be replaced by steel girders.——A statue of Buffon, by M. Carlus, is to be placed in the Jardin des Plantes at Paris.—— A new square, under the name "Square Carpeaux," is to be formed at Montmartre, on a site between Rue Marcadet, Rue Carpeaux, and Rue de Maistre.——M. Delorme, of Lyons, has been commissioned to carry out a group of schools at Miribel (Ain).——The Municipality of Toulouse are about to open a competition for the building of a suburban hospital.—The Municipality of Lyons have voted a sum of 120,000 francs for the improvement of the Hôtel Dieu.——M. Pascault, architect, of Bourges, has been elected president, for the next two years, of the Association Regionale of architects of the centre of France.——M. Albert Charles Tissandier, a member of the Société Centrale des Architectes, has died at Pau at the age of 67. He was a pupil of André and of the Ecole des Beaux-Arts. Since 1867 he had frequently exhibited in the annual Salons, and received medals in 1892 and 1895, and a silver medal at the universal exhibition of 1900.——The death is also announced, at the age of 55, of M. Joseph Malézieux, architect, of Saint-Quentin, a former president of the Société des Architectes de l'Aisne, and Vice-President of the Société d'Assistance Confraternelle of French architects.

ITALY.—For centuries engineers have been occupied with the question of improving the Tiber for navigation purposes. In Roman times ships could sail up to Perugia, a distance of 320 kilomètres. A century ago they could only reach Orte, half-way to Perugia; and recently the damage done by floods has practically stopped navigation. The great flood of 1870, which rose 11·42 mètres above normal level, and laid the lower parts of Rome under 4 mètres of water, forced the authorities to take preventive measures. The work of embanking the river is now almost completed, and has cost about 100 million francs. The walls of tufa, faced with dressed stone, are 7 mètres thick at the base, and the foundations reach 9 mètres below low-water mark. In 1900 occurred a phenomenal rise in the water level, but the works were far enough advanced to avert disaster. Another difficulty to be contended with in the Tiber is the amount of solid matter the water carries in suspension, which fills up the delta and causes the sea to recede. The old harbour of Ostia, built 633 B.C. by Ancus Martius now lies 4 kilomètres inland. It has been estimated that in 1 cm. of water there are 1,460 gr. of matter in suspension, so that yearly the Tiber carries to the sea 5 million cubic mètres of deposit. A proposal is now under consideration to further facilitate navigation between Orte and the sea by building a number of locks, by dredging the silted-up mouth at Ostia, and by making a new bed to carry off the surplus water.——The seventh International Art Exhibition will be held in Venice from April 22 to October 31 next year. It will be divided into Italian, foreign, and international sections, and the most distinguished artists will be invited to participate, but nothing which has already been exhibited in Italy will be accepted. The work of artists not personally invited will be submitted to the decision of a jury of admission, composed of five members. Except in the cases of collections of certain celebrated artists, either living or deceased, and in other special circumstances, no artist will be allowed to send more than two exhibits of the same class. Gold medals will be awarded to the best artistic and decorative works. Intending exhibitors must give notice in a duplicate form not later than January 1, 1907. Applications for forms and all subsequent communications must be made to "Segretario Esposizione, Artistica, Municipio, Venice, Italy." The exhibits must reach the exhibition building not later than March 25. Amplest facilities will be granted to foreign artists. With a view to improving the artistic taste of the public in their every-day life, the decoration and fitting-up of the exhibition will be undertaken by the best modern artistic house decorators, always provided the decorations are made to harmonise with the other works of art exhibited in the different rooms.

GERMANY.—Germany was the first nation to recognise, as early as 1749, that, in the interests of safety, navigation requires theoretical as well as practical education. But it was only last autumn that the first school was opened in Hamburg, where instruction is given in all the varied and ever-increasing branches of navigation. This important work was ably planned by Herr Zimmerman, and built at a cost of 477,500 marks.

SWITZERLAND.—In twenty-four hours 5,370,000 cubic mètres of fresh air are forced through the Simplon Tunnel. The temperature of the air taken lately at the north entrance was 11·6 deg. C.; half-way through this rose to 27 deg. C., and at 15 kilomètres it was 29·5 deg. C. In order to cool the air, the sides of the tunnel are sprinkled with water pumped in from the north entrance.——On August 30 died Hans Auer, the designer of the new Houses of Parliament, Bern. Rarely does the work of an architect arouse, during his lifetime, the amount of diverse and passionate criticism which this building evoked. It was chiefly the younger school that condemned him, but future generations will be more just to him than were his contemporaries. Auer published numerous works on architecture, and was appointed Professor of Architecture to the Bern University in 1890, besides receiving various honours from the Austrian Government.

EGYPT.—The Sudan Government will shortly dispose by tender of about 400 building sites at Port Sudan. The sites will be leasehold, held at annual rents on building lease for eighty years from January 1, 1907. Rent will be payable only from date of acceptance of tender. The lease will be perpetually renewable at revised rents fixed in default of agreement by arbitration at the end of each term of years. In fixing the revised rents the value of buildings erected by lessees will not be regarded as a ground for increase of rent. Offers are invited of premiums for the purchase of the above-mentioned leasehold sites. All offers must be made by tender, on the forms issued by the Sudan Government, and must be received at Khartoum not later than January 1, 1907. Particulars of the sites offered, plan of the town, conditions of tender and sale, form of tender, specimen form of lease, etc., will, on and after October 1, 1906, be open to inspection at the following places during the usual business hours:—

Khartoum—* Office of Director of Agriculture and Lands and Office of Governor of Khartoum Province.
Cairo—* Office of Sudan Agent.
Port Sudan—* Office of Inspector (Government Offices).
London—* Office of Colonel Western, Queen Anne's-chambers, Westminster, S.W.; the Sudan Court, Imperial Institute, S.W.

Copies of the documents will be obtainable after October 1, 1906, on payment of 5 piastres, Turkish, or 1s. per copy at the offices marked *. Further information will be obtainable after the publication of the above-mentioned documents on application in writing to the Director of Agriculture and Lands, Khartoum.—*Board of Trade Journal.*

SOUTH AFRICA.—The new telephone exchange in Von Brandi's-square, Johannesburg, has just been completed at a cost of 24,000*l*. The building has been designed and constructed by the Public Works Department.——By the removal of the old block of buildings, known as Hofmeyr's-chambers, which used to project into the frontage line of Adderley-street, in Cape Town, the architectural appearance of that important thoroughfare has been greatly improved. The main building, a four-story one, built by Messrs. Hopkins & Co., from the plans of Mr. M. B. Torstenson, is now in line with the rest of the buildings in the street, and the whole of the tower of the old Dutch Reformed Church is brought into view. The new building was arranged on structural English steelwork, supplied and set up by Messrs. Dorman, Long, & Co.

SIAMESE TEAK TRADE.—In his annual Report on the trade of Bangkok, just received at the Foreign Office, Mr. Acting-Consul Lyle states that teak, valued at 817,396*l*., represented 13 per cent. of the trade for 1905. The export of teak, 101,397 tons, exceeded even the record figures of 1904 (77,531 tons, valued at 560,174*l*.). Under these circumstances the five years' average fell below the 1905 output by 45,133 tons and 434,515*l*. value respectively. The various countries to which the timber was shipped, the quantity being given in tons:—India, 66,788; Hong-Kong, 9,848; United Kingdom, 5,577; Singapore, 4,185; Japan, 4,877; Azores, 2,629; France and possessions, 2,592; Germany, 1,493; Denmark, 1,033; other places in Europe, 2,375; total, 101,397 tons. The following remarks, gathered from an experienced source, explain (observes Mr. Lyle) the present unusual figures, and afford an insight into the future prospects of the Siam teak trade:—"The past season, 1905-06, has been a record one as regards floating, and no less than 151,000 logs arrived at Paknampho. This number, with stocks of 60,000 logs carried over at that place from the previous season, gives a total of 211,000 logs for disposal, and of these about 125,000 logs reached Bangkok. The three previous seasons, viz., 1902-03 to 1904-05, gave arrivals at Paknampho about 61,000, 113,000, and 138,000 logs respectively. As recorded in previous reports, these results have been due to the fact that an accumulation of logs worked under the old leases which were lying in the side creeks and main rivers have been brought down by the extremely favourable waters experienced during the above-mentioned years. Stocks in creeks will now show a heavy decrease, and the out-turn of logs at Paknampho will, under the present rules as regards girdling, never attain to the above dimensions. Should the 1906-07 floating season again be an exceptionally good one, there may possibly not be any very great falling-off in the actual arrivals at Paknampho

for this year, but the year 1905-06 will almost certainly mark the turning-point in the volume of the teak trade of Siam. There has been again a considerable falling-off in the quality of the arrivals between the year 1905-06 and the previous year, 1904-05, possibly about 7 per cent. (10 per cent. in 1904-05) being of the quality necessary for shipment to Europe, and 35 or 36 per cent. being only fit to be broken up into small material before shipment. Prices for round timber of fair size and quality maintained a steady upward tendency during the year, rising from about 16 pikat at the end of 1904 to 19 to 20 pikat at the close of 1905. Local prices for Europe squares rose from about 10*l.* to 12*l.* (1904, 8*l.* to 10*l.*), and for Europe planks (1904, 9*l.* to 11*l.*) from 11*l.* to nearly 13*l.* The rise in price is response to a good demand in all the consuming markets for teak both at home and in the East. As far as can be seen at present, the prospects of these prices for teak remaining at their present level appear to be good. Considerable activity is reported in shipbuilding and railway centres in most parts of the world, and it is not unlikely that further developments, both in China and Japan, may call for increasing consumption of teak at good prices. At present difficulties in means of shipment, caused by the bar at the mouth of the river, considerably hamper the export trade, and continue to keep Siam teak at a disadvantage with timber from Burma, and there is no doubt that cheapening the means of transport would result in a wider scope for teak from this country." Mr. Consul Stringer writes from Chiengmai that the amount of teak exported from that consular district to Burma in 1905 was only 8,163 tons, as compared with 9,447 tons in 1904 and an average of 16,058 tons for the last five years. The value shows a decrease of 13,050*l.* as compared with 1904, and of 34,962*l.* as compared with the five years' average. This decrease in the export to Burma is probably due principally to stricter conservancy of the teak forests by the Siamese Forest Department and partly to increasing scarcity of teak trees and difficulty of working the forests on the Salween side. These forests are worked by one British firm, and this and three other British firms and one Danish company practically monopolise the teak industry of the whole district. The thefts of elephants referred to in previous reports appear to be increasing. One of the British firms in Chiengmai reports that they had twelve of their elephants stolen last year, and about the same number belonging to their contractors. Another firm reports that nine elephants belonging to them or their contractors were stolen during 1905, and that only three of these were recovered. As most of the elephants stolen are timber elephants employed in the teak forests, and the average value per head of such elephants is about 200*l.* or more, the persistent stealing of these animals which now goes on in the district results in heavy loss to the teak merchants and their contractors (most of whom are British subjects), since, in addition to the value of an elephant, the owner's forest work suffers considerably, even if only one is stolen; and if it is not recovered he has to pay large sums in rewards to the captors, unless he has recovered it himself.

CHILE.—The Board of Trade are in receipt of information to the effect that the Chilian Government has under consideration the advisability of exempting building materials from import duty in order to facilitate the reconstruction of the city of Valparaiso, and that it is probable that Congress, at its approaching session, will be invited to pass a law granting such exemption.

Miscellaneous.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Mr. E. W. Mountford has removed his office from 17, Buckingham-street, Strand, to Norwich House, Southampton-street, Bloomsbury, W.C.——Mr. W. F. Chambers, architect and surveyor, has removed his offices from Waldorf-chambers to 7, John-street, Adelphi, W.C.——The Alliance Rubber Company are closing their City offices, and all business will, in future, be transacted at their works, Leswin-road, Stoke Newington, N.

WAR MEMORIAL, GLASGOW.—A memorial is being erected in Kelvingrove Park to the memory of the officers and men of the Highland Light Infantry who fell in the South African War. The monument occupies a triangular site, surrounded by shrubbery, at the east end of the Prince of Wales Bridge. The work of construction is under the supervision of Mr. A. B. M'Donald, the City Engineer, and Mr. James Whitton, the Parks Superintendent. The sculptor is Mr. Birnie Rhind, R.S.A., Edinburgh.

BREAKING-UP STREETS IN LONDON.—The Works Committee of Kensington Borough Council, in a Report issued on Saturday, stated they had considered a letter from the London County Council calling attention to the great inconvenience caused by the breaking-up of streets in London by companies and others having statutory rights to do so, and stating that the Spring-gardens authorities were of opinion that great advantage would result if arrangements could be made for works to be carried out by the different authorities having power to break-up streets simultaneously at certain periods of the year. The London County Council asked, would the Borough Council be prepared to support them if they promoted legislation to make regulations to govern the breaking-up of streets? The Borough Engineer, to whom the foregoing communication was referred, expressed the opinion that it would be undesirable that work done by statutory authorities in London should be carried out simultaneously, as many of the principal thoroughfares in the metropolis would be annually barricaded at the same time. He further pointed out that, if a certain period in the year were arbitrarily fixed during which any company or authority might open up streets, same saving clause would have to be inserted to provide for the opening-up of roads in cases of emergency, and that it would be found in practice that fully 90 per cent. of the work would prove to be "emergency" work. It was, however, suggested by the Borough Engineer that useful legislation might be promoted to strengthen the hands of the metropolitan borough councils in supervising and controlling the works carried out by statutory companies, provision being made by such legislation for the framing of regulations to deal with the following matters, viz.:—(1) The position, depth, and direction of mains; (2) the maintenance of the surface at the expense of the company for a period after the surface has been disturbed by such company; (3) that the time during which intended works may be carried out after reasonable notice has been given by a borough council to a statutory company, of such council's intention to renew the surface of given streets. The Committee concurred in the views of the Borough Engineer, and a communication, embodying the substance of the Borough Engineer's report, is to be addressed to the London County Council in reply to their letter.

UNIVERSITY COLLEGE, LONDON.—A course of study and a scheme of examination in architecture is approved by the Senate, who have instituted that subject as a branch of the B.A. Honours degree for internal students. The Senate have resolved to expend 12,000*l.* upon the erection of buildings, after plans and designs by Mr. Reginald Blomfield, A.R.A., at Goldsmiths' College, New Cross, for the art school and training departments. The new buildings will form portion of a larger scheme which, it is hoped, will be ultimately accomplished.

NEW TOWN HALL FOR MARYLEBONE.—The General Purposes Committee of Marylebone Borough Council, in a Report circulated on Tuesday, stated that they considered an architect should be engaged to draw up a report, with preliminary sketch plans, as to the suitability and adaptability of various proposed sites in the borough for the erection of a building to include municipal offices, Council chamber, committee-rooms, etc., and to give an approximate estimate of the cost of same. They propose that the fee to be paid to the architect engaged be 100 guineas.

LEASEHOLDERS AND STRUCTURAL REPAIRS.—At the meeting, on Tuesday, of Kensington Borough Council, the Public Health Committee reported that their attention had been drawn by the Housing Sub-Committee to recent action taken by freeholders of property in certain parts of the borough, in requiring the leaseholders to execute structural repairs to their holdings, with the result that the sanitary condition of the localities referred to was being gradually improved. The Sub-Committee further pointed out that, in their opinion, much good might be effected if this example were followed by other ground landlords in North Kensington, and they had suggested that they should be authorised to obtain reports from the officials of the Public Health Department as to the condition of properties on certain of the estates in the northern portion of the borough, with a view to their reporting on any special cases in which they might think it desirable that the Council, in the interests of public health, should bring the state of the property to the notice of the freeholders, and urge them to take action to bring about an improved condition of things in regard thereto. The Committee had approved of the suggestion made by the Housing Sub-Committee, and had, on the grounds of public health, given them the authority asked for. The Report was adopted.

LIBRARY FOR EAST HAM.—At a recent meeting of East Ham Town Council, the Engineer (Mr. A. H. Campbell, M.Inst.C.E.) submitted a draft sketch plan of the site and elevation of the new Carnegie library, which was approved and directions were given for the work in connexion with the foundations to be proceeded with. The site of the library is about 50 ft. from the southern wall of the town hall, and the Engineer was directed to submit a draft plan, and report as to the probable cost of erecting offices for the accommodation of the Public Health and Educational Departments on the intervening site.

THE "AUTO-VALVE."—Mr. A. H. Marshall, electrical engineer, Leytonstone, sends us a sample of his "auto-valve," the object of which is to provide automatically for the stoppage of the water when a tap is removed for repair. The device is simple but ingenious. A small piston is placed loose in the pipe just behind the seating of the tap, with a short rod with cross-head projecting from its centre into the base of the tap. As long as the tap is in position the piston is held back by the back edge of the tap acting against the cross-head; when the tap is taken out the pressure of the water forces the piston forward, closing the water-way. It is an ingenious device which would save a good deal of trouble, as it does away with the necessity for turning off the water in order to take a tap out; and there is nothing about it that can get out of order, as the thing is quite loosely fitted. The only objection to be made to it would be that when not in use it impedes the water-way a little; but not to such an extent as to be a serious drawback.

Capital and Labour.

CONDITION OF THE BUILDING TRADES.—Employment continued dull, but was, on the whole, better than a month ago and a year ago. London: In London employment was better than a month ago, but not so good as a year ago. Returns received through the trade correspondent from thirty-seven London employers show that in the last week of August 7,841 workpeople were paid wages, as compared with 7,035 a month ago, and 8,607 in August, 1905. From trade union returns relating to carpenters and joiners it appears that the percentage of unemployed in London at the end of August was 5·5, as compared with 7·8 a month ago, and 5·5 a year ago. With plumbers the percentage for August was 7·5, for July 14·3, and was a year ago 8·7—a considerable improvement being shown as compared with a month ago. With bricklayers a slight decline was shown, but with all other branches, particularly with builders' labourers, a marked improvement took place as compared with July. The Provinces: Returns received from sixty-eight employers' associations in towns outside London show that in these towns employment was slack generally, and showed little change compared with a month ago and a year ago. The following information is based on returns received from the general secretaries of trade unions and from trade union reports:—Employment with bricklayers and masons was dull, and showed a decline as compared with a month ago. With carpenters and joiners it was still slack, but better than a month ago and a year ago. The percentage unemployed of trade union carpenters and joiners in the whole of the United Kingdom was 5·1, as compared with 5·3 a month ago and 6·5 a year ago; with plumbers the percentage was 7·5, as compared with 8·9 a month ago and a year ago. With slaters, plasterers, and builders' labourers there was a slight improvement as compared with a month ago; with painters little change was shown.—*Labour Gazette.*

Patents of the Week.

APPLICATIONS PUBLISHED.*

24,908 of 1905.—H. MERRYWEATHER, S. H. MERRYWEATHER, and H. MERRYWEATHER, JUN.: *Door, Gate, and the like Furniture or Fittings.*

This relates to a door, gate, and the like furniture or fittings, and consists in the combination with a hinge pin, latch, or the like bar for use with a door, of a movable bonding iron or bar. The bar is built into the brickwork or the like, and its projecting end carries the hinge pin or the like releasing or

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

PATENTS.—*Continued on page 383.*

List of Competitions, Contracts, etc.

For some Contracts still open, but not included in this List, see previous issues. Those with an asterisk (*) are advertised in this Number: Competitions, —; Contracts, iv. vi. viii. x.; Public Appointments, xix; Auction Sales, xxx.

Certain conditions, beyond those given in the following information, are imposed in some cases, such as: the advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bonâ-fide tender unless stated to the contrary.

Contracts.

BUILDING.

OCTOBER 1.—**Great Corby.**—HOUSE.—Tenders are invited for building and finishing a house at Great Corby. Plans and specifications may be seen at 71, Broad-street, Carlisle, where tenders have to be delivered on October 1. Mr. James Leslie, architect.

OCTOBER 1. — **Seaham.** — CHURCH PORCH. — The Trustees of the Seaham Harbour Wesleyan Church invite tenders for the erection of a porch to their chapel at Seaham Harbour. Plans and specification may be seen on application to the architects, Messrs. W. & T. R. Milburn, 20, Fawcett-street, Sunderland. Tenders will be received not later than 12 noon on October 1.

OCTOBER 1.—**Walbottle.**—SCHOOLS.—Tenders for the erection of proposed new schools at Walbottle Village, for His Grace the Duke of Northumberland. Names to Mr. J. Wightman Douglas, architect and surveyor, 1, St. Nicholas-buildings, Newcastle, not later than October 1, when quantities will be supplied.

OCTOBER 2.—**Blackrock.**—REPAIRS.—The U.D.C. of Blackrock invite tenders for the following works in connexion with the new assembly room, Town Hall, Blackrock:—(*a*) Overhauling and repairing roof; (*b*) extension and repair of present ceiling and plaster work; (*c*) construction of platform. Tenders for each of the several works to be on separate forms. Plans and specifications can be seen, and particulars obtained, at the Town Hall, Blackrock. Tenders, on forms supplied, must be lodged with Mr. R. Finlay Heron, Town Clerk, Town Hall, Blackrock, Co. Dublin, on or before 4 o'clock p.m., October 2.

OCTOBER 2. — **Cardiff.** — WAREHOUSE. — Tenders are invited for the erection of a warehouse in Millicent-street, Cardiff. Drawings and specification can be seen, and quantities can be obtained, upon payment of 1*l.* 1s., at the office of Mr. John H. Phillips, F.R.I.B.A., Clive Chambers, Windsor-place, Cardiff, to whom sealed tenders are to be delivered on or before October 2.

OCTOBER 2. — **Coventry.** — STABLING, ETC. — Tenders are required for additions to stabling, etc., Cox-street, and Brewery-street, Coventry, for the Coventry Perseverance Co-operative Society, Ltd. Plans and specifications can be seen at offices of Messrs. Harrison & Hattrell, architects, 23, Hertford-street, Coventry. Sealed and endorsed tenders to be delivered to the Secretary, West Orchard, Coventry, at noon on October 2.

OCTOBER 2.—**Exeter.**—OFFICE REPAIRS.—The Exeter Guardians invite tenders for certain plumber's and builder's work at their offices, New-buildings, Exeter. Specifications may be obtained at the office of their architect, Mr. R. M. Challice, 14, Bedford-circus, Exeter. Sealed and endorsed tenders must be sent to Mr. Arthur Snell, Clerk to the Guardians, New-buildings, Castle-street, Exeter, on or before 12 o'clock noon on October 2.

OCTOBER 2.—**Exeter.**—WORKHOUSE REPAIRS, ETC.—The Exeter Guardians invite tenders for painting and general reparation at the City Workhouse. Specifications may be seen, and particulars obtained, at the office of their architect, Mr. R. M. Challice, 14, Bedford-circus, Exeter. Sealed and endorsed tenders must be sent to Mr. Arthur Snell, Clerk to the Guardians, New-buildings, Castle-street, Exeter, on or before 12 o'clock noon on October 2.

* OCTOBER 2.—**Orsett.**—ALTERATIONS TO WORK HOUSE.—The Guardians of the Orsett Union invite tenders for alterations and additions to the above workhouse. Names and addresses to be sent to the architect, Mr. C. M. Shiner, 110, Hamilton House, Bishopsgate-street Without, E.C., or at Gate House, High-street, Grays, Essex, before 12 noon, October 2.

OCTOBER 2.—**Penalltau.**—VILLAS.—Tenders are invited for the erection of semi-detached villas at Penalltau, Ystrad-Mynach. Plans and specification can be seen, and bills of quantities obtained, at the office of the architect, Mr. Geo. Kenshole, Station-road, Bargoed, on payment of 2*l.* 2s., which will be returned on receipt of a bona fide tender. Sealed and endorsed tenders to be sent to Mr. E. M. Hann, Aberaman, Aberdare, on or before October 2.

OCTOBER 2.—**Treherbert.**—SHOP ALTERATIONS.—Tenders are invited for carrying out alterations and additions to co-operative shop, Treherbert, for the Ton Industrial Co-operative Society, Ltd. Plans and specification may be seen at office of Mr. W. D. Morgan, M.S.A., architect, Post-office Chambers. Sealed and endorsed tenders to be delivered to the Chairman before 5 p.m. on October 2.

OCTOBER 3.—**Plumstead.**—INFIRMARY ADDITIONS.—The Guardians of the Woolwich Union require tenders for additions of kitchens and stores at the Woolwich Union Infirmary, Plumstead. The plans and specifications can be inspected, and copies of the quantities obtained, at the offices of the Board's Architect, Mr. J. O. Cook, 1a, Eleanor-road, Woolwich. A deposit of 1*l.* 1s. will be required for the bills of quantities. Tenders must be sent to Mr. Tom Cutter, Clerk to the Guardians, not later than 4 p.m. on October 3, at No. 30, Rectory-place, Woolwich.

OCTOBER 4.—**Croyde.**—MINISTER'S HOUSE.—Tenders are invited for the erection of a Baptist Minister's house at Croyde. Plans, specification, and quantities may be obtained at office of Mr. J. C. Southcombe, architect, Barnstaple, and tenders to be sent to the Rev. A. F. Scudamore, Croyde, on October 4.

OCTOBER 4. — **Lyminge.** — CHIMNEY SHAFT, ETC. — Ebham Union invite tenders for the erection of a chimney shaft and alterations to a boiler-house at the Workhouse, Lyminge; also separate tender for taking out two boilers and fixing two other boilers and an economiser. Plans and specifications can be seen between 10 and 5 o'clock, except on Saturdays, when they can be seen between 10 and 1 p.m., at the office of Mr. R. Lonergan, Clerk, 11, Cheriton-place, Folkestone, where tenders must be delivered before October 4.

OCTOBER 4.—**Swadlincote.**—PUBLIC CONVENIENCES, ETC.—The Swadlincote U.D.C. invite tenders for the erection of lock-up shop and public conveniences, and for the pulling down and removal of existing public conveniences and shops in Midland-road, Swadlincote. Drawing and specifications may be seen, and quantities and forms of tender obtained, at office of Mr. A. J. Mason, A.M.Inst.C.E., Town Engineer and Surveyor, Swadlincote, on depositing 1*l.* 1s. Tenders, enclosed in the envelopes provided, are to be delivered at the Clerk's Office, Belmont-street, Swadlincote, not later than 10 a.m. on October 4.

OCTOBER 4. — **Swansea.** — HOUSES. — The Swansea Harbour Trustees invite tenders for the erection of four dwelling-houses at Port Tenant, Swansea. Drawings and specifications can be inspected at the office of the Trustees' Engineer, Mr. A. O. Schenk, M.Inst.C.E., and forms of tenders obtained from Mr. Talfourd Strick, Clerk, Harbour Offices, Swansea, to whom tenders, endorsed "Tender for Dwelling-houses," should be delivered not later than 10 a.m., October 4.

OCTOBER 5. — **Mallow.** — LODGING-HOUSES. — The Mallow U.D.C. invite tenders for the erection of twelve working-class lodging-houses in the town of Mallow, in accordance with the drawings and specification prepared by Mr. D. J. Buckley, architect, 53, South Mall, Cork, at whose office they can be seen, and form of tender obtained, or at the office of Mr. T. Wrixon, Clerk of the Council, Mallow U.D.C. Office, William O'Brien-street, Mallow, any day (Sundays excepted), between the hours of 10 a.m. and 4 p.m. A deposit of 20*l.* must accompany each tender. Sealed tenders, endorsed "Working-class Lodging-houses," must be handed in at the meeting of the Council, to be held on October 5, between 7 p.m. and 8 p.m.

OCTOBER 5.—**Mallow.**—TOWN HALL IMPROVEMENTS.—Mallow U.D.C. invite tenders for the execution of certain alterations and repairs at the Town Hall, Mallow, in accordance with the drawings and specification prepared by Mr. D. J. Buckley, architect, 53, South Mall, Cork. Drawings and specification can be seen, and form of tender obtained, on application at the architect's office, and from Mr. T. Wrixon, Clerk of the Council, U.D.C. Office, William O'Brien-street, Mallow, any day (Sundays excepted) between the hours of 10 a.m. and 4 p.m. A deposit of 20*l.* must accompany each tender. Sealed tenders, endorsed "Town Hall," must be handed in at the meeting of the Mallow U.D.C. on October 5, between the hours of 7 p.m. and 8 p.m.

OCTOBER 6.—**Cwm.**—CHAPEL.—Tenders are invited for the erection of a new Baptist Chapel, at Cwm. Drawings and specifications can be seen at the office of Mr. N. Gasenius Lewis, architect and surveyor, Oak-street, Abertillery. Tenders, endorsed "New Chapel, Cwm," to be in the hands of the Secretary, Mr. Hy. Howells, 9, Railway View, Cwm, Mon., by noon, October 6.

OCTOBER 6.—**Deal.**—SCHOOL.—The Education Committee of the Borough of Deal invite tenders for the erection of a new school, to accommodate 240 infants, together with boundary walls and other site works, at Deal. The drawings and specification may be inspected at the office of the architect, Mr. Chas. L. Crowther, Queen-street, Deal, from whom also a copy of the bills of quantities may be obtained upon payment of a deposit of 1*l.* 1s. Tenders, on the form and in the envelope supplied, to be delivered to Mr. Alfred C. Brown, Clerk to the Committee, High-street, Deal, not later than October 6.

OCTOBER 6.—**Holywell Green.**—HOUSES.—Tenders are invited for the mason's, carpenter's and joiner's, plasterer's and slater's, and painter's trades for the erection of five dwelling-houses at Holywell Green. Plans and specifications may be seen, and quantities obtained, at offices of Messrs. Chas. F. L. Horsfall & Son, architects, Lord-street-chambers, Halifax, from October 1 to October 6, when sealed tenders must be delivered not later than 12 o'clock.

OCTOBER 6.—**Reddish.**—PUBLIC BATHS, ETC.—Stockport Corporation invite tenders for the erection of public baths, fire-station, and free library in Gorton-road, Reddish. The plans, drawings, specification, and general conditions may be inspected, and a form of tender obtained, at the office of the architects, Messrs. Dixon & Potter, of 65, King-street, Manchester, and quantities will be supplied by them on payment of a deposit of 2*l.* 2s. Sealed tenders, endorsed "Reddish Baths Contract," must be delivered to Mr. Robert Hyde, Town Clerk, Town Clerk's Office, Stockport, not later than 12 o'clock noon on October 6.

OCTOBER 8. — **Abergwynfi.** — ADDITIONS TO HALL.— Tenders are invited for the erection of additions—billiard and ante rooms—to the Workmen's Hall, Abergwynfi. Plans may be seen, and bills of quantities obtained, at the Institute on deposit of 2*l.* 2s. Sealed tenders to be delivered to the Secretary not later than October 8.

OCTOBER 8.—**Carrick-on-Shannon.**—POST OFFICE. —Board of Public Works invite tenders for the erection of a new Crown Post Office at Carrick-on-Shannon, co. Leitrim. The plans and specification can be seen at the Post Office, Carrick-on-Shannon. Forms of tender and bills of quantities will be supplied on deposit of 1*l.* The separate envelopes containing the tender and the bill of quantities must be endorsed, and sent to Mr. H. Williams, Secretary, Office of Public Works, Dublin, not later than 10 a.m. on October 8.

OCTOBER 8. — **Sedgefield.** — NURSES' HOME.—The Visiting Committee of Durham County Asylum, Sedgefield, invite tenders for the erection of a nurses' home. Plans and conditions of contract may be seen, and bills of quantities obtained, at the office of Mr. William Crozier, A.M.Inst.C.E., County Architect, Shire Hall, Durham, to whom sealed tenders are to be delivered not later than 1 p.m. on October 8, endorsed "Tender for Nurses' Home."

OCTOBER 8. — **Skewen.** — CHAPEL.—Tenders are invited for the erection of Congregational Chapel at Skewen, Neath. Plans, specifications, etc., can be seen at the architects' office (Messrs. Lloyd & Martyn, Dynevor Post Office, Skewen), upon payment of 1*l.* 1s. Endorsed tenders to be sent to Mr. William Davies, Stanley-road, Skewen, Neath, on or before October 8.

OCTOBER 9.—**Dublin.**—COMPLETION OF GYMNASIUM.— Board of Public Works invite tenders for the erection and completion of a gymnasium at the Royal Hibernian Military School, Phœnix Park. Plans and specification can be seen at the Office of Public Works, Dublin. Forms of tender and bills of quantities will be supplied on deposit of 1*l.* The separate envelopes containing the tender and the bill of quantities must be endorsed, and will be received up to, but not later than, 10 a.m. on October 9, at the Office of Public Works, Dublin.

OCTOBER 9. — **Ynysybwl.** — HOUSE.—Mountain Ash U.D.C. invite tenders for the erection of a dwelling-house near Ynysybwl Cemetery. Plans and specification may be seen, and forms of tender obtained, on application to Mr. W. G. Thomas, Surveyor, Town Hall, Mountain Ash. Sealed tenders, prepaid, and endorsed "Ynysybwl Cemetery," to be received by Mr. H. P. Linton, Clerk, Town Hall, Mountain Ash, not later than 10 a.m. on October 9.

OCTOBER 10. — **Bangour.** — HALL.—The Edinburgh and District Board of Lunacy invite offers for the mason, steel and iron, plumber, plaster, slater, and glazier works in connexion with the erection of recreation hall at Bangour Village. Schedules may be obtained on application to the architect, Mr. Hippolyte J. Blanc, R.S.A., 25, Rutland-square, Edinburgh, where the specification, plans, and the general conditions of contract will be exhibited. The carpenter and joiner work schedules will be issued on October 1. Schedules, priced and extended, must be lodged with Mr. James Kyd, Clerk and Treasurer, Chambers of District Board, Castle-terrace, Edinburgh, not later than October 10, along with the tender, each enclosed in a separate cover, to be supplied.

OCTOBER 11.—**Monaghan.**—BOUNDARY WALL.—The Joint Committee of Monaghan Asylum invite tenders for erection of a boundary wall in accordance with plan and specification which may be seen at the Board-room of the Asylum between 10 o'clock a.m. and 5 p.m. on any week-day. Tenders to be forwarded by registered post, endorsed "Tender for Boundary Wall," when they will be opened at the meeting of the Committee on October 11.

OCTOBER 12. — **Monkwearmouth.** — FACTORY AND OFFICES.—Tenders are required for the erection of a factory, offices, etc., near Fulwell-road, Monkwearmouth, for Messrs. D. H. & G. Haggie. Plans and specifications can be seen, and particulars obtained, at the offices of Messrs. Joseph Potts & Son, architects and surveyors, 57, John-street, Sunderland, and quantities can be obtained on the payment of 3*l.* 3s. Tenders to be sealed, endorsed, and delivered to the architects not later than October 12.

OCTOBER 12. — **Newport.** — INFIRMARY BUILDINGS.— The Guardians of the Newport (Salop) Union invite tenders for the erection of new infirmary buildings, adjoining the present Workhouse. Plans and specifications can be seen, and bills of quantities and forms of tender obtained, on application to Messrs. Fleeming & Son, architects, Bank Chambers, Wellington (Salop); 1*l.* 1s. will be charged for copy of bills of quantities. Tenders must be delivered to Mr. R. P. Liddle, Clerk to the Guardians, Newport, not later than 9 o'clock a.m. on October 12.

OCTOBER 13. — **Bridgend.** — MORTUARY.—The Guardians of Bridgend and Cowbridge Union invite tenders for erecting a mortuary, etc., at the workhouse. Plans, etc., may be seen, and all particulars obtained, at the office of Mr. P. J. Thomas, architect, Bridgend. Tenders, endorsed "Mortuary," to be received by Mr. R. Harmar Cox, Clerk, Union Offices, Bridgend, before October 13.

OCTOBER 13. — **Donisthorpe.**—SCHOOL.—Education Committee of the Leicestershire C.C. invite tenders for the erection of a school at Donisthorpe, together with out-offices, drainage, etc. Conditions of con-

track, quantities, and form of tender may be obtained from the architect, Mr. W. H. Simpson, Corridor Chambers, Market-place, Leicester, on payment of 2l. 2s. Sealed tenders, upon forms supplied, to be sent in the envelope provided, to County Education Office, 33, Bowling-green-street, Leicester, not later than 10 a.m., on October 13, addressed to "The Chairman of the Building and Sites Committee."

* OCTOBER 13.—**Paddington.**—BUILDING BRIDGE.—The Borough Council of Paddington invite tenders for pulling down bridge, and constructing and erecting new brick, concrete, and steel carriageway bridge (30-ft. span), new toll-keeper's office, etc., in and about Warwick-avenue. Forms of tender, specifications, bills of quantities, etc., obtainable on application to Borough Surveyor. Drawings may be seen, and further particulars obtained, from 10 a.m. to 4 p.m. (Saturdays, 10 a.m. to 1 p.m.), as above. Sealed tenders, endorsed "Reconstruction of Warwick-avenue Bridge," "No. 1 Building Constructional Works," "No. 2 Steel Works," or "No. 3. Nos. 1 and 2 together," to be delivered to the Town Clerk, Town Hall, Paddington, W., not later than October 13.

* OCTOBER 15.—**Coventry.**—BUILDINGS.—The Gas Committee of the Coventry Corporation invite tenders for buildings at their Foleshill Works. The drawings may be seen, and specifications, with form of tender and bill of quantities obtained, on and after October 1, on payment of 1l. 1s. Sealed tenders, addressed to the Chairman of the Gas Committee, Gas Works, Coventry, endorsed "Tender for Retort House and Coal Stores, etc.," must be delivered before 9 a.m., October 15.

* OCTOBER 16.—**London.**—UNDERGROUND CONVENIENCES.—The Streets Committee of the Corporation of London invite tenders for alterations and additions to underground conveniences in Bishopsgate Without and Aldgate, according to drawings and specifications, to be seen at the Office of the Engineer to the Corporation, Guildhall, between 10 and 5, and bills of quantities and forms of tender may be obtained on payment of 1l. Tenders, addressed to Town Clerk, Public Health Department, Guildhall, E.C., endorsed "Underground Conveniences," to be delivered at the Office of the Hall Keeper, Guildhall, between 12.30 and 1.30, on or before October 16.

OCTOBER 17.—**Cleethorpes.**—SCHOOL.—Lindsey C.C. Education Committee invite tenders for the erection of an elementary school in Elliston-street, Cleethorpes. Bills of quantities and form of tender may be had on application to Messrs Scorer & Gamble, architects, Bank-street Chambers, Lincoln, on or before October 8, and on payment to them of 2l. 2s. The drawings and conditions of contract may be inspected at the offices of the architects. Tenders must be delivered to Mr. S. Maudson Grant, Secretary, 286, High-street, Lincoln, in the envelope provided, before 10 a.m. on October 17.

* OCTOBER 20.—**Stafford.**—SCHOOL.—The Staffordshire Education Committee invite tenders for new high school for girls, Stafford. Builders desiring to tender should apply to Mr. Graham Balfour, Director of Education, County Education Offices, Stafford, on or before October 20. Quantities will be supplied on payment of 2l. 2s.

* OCTOBER 30.—**Manchester.**—SCHOOL.—The Education Committee invite tenders for the erection of Oswald-road Municipal School, Chorlton-cum-Hardy, Manchester. Plans may be seen, and bills of quantities, etc., obtained, on and after September 29, at the Education Offices, Deansgate, Manchester, on deposit of 2l. 2s. Tenders, in envelope provided, to be delivered not later than October 30.

NO DATE.—**Belfast.**—STORES AND OFFICES.—Tenders are required for building new stores and offices in Little Donegall-street for Messrs. J. & R. O'Kane & Co. Applications for quantities to be made to Mr. S. W. Hunter, surveyor, Scottish Provident Buildings. Plans and specifications can be inspected at the offices of Messrs. E. & J. Byrne, architects, 4, Waring-street.

NO DATE.—**Earlston.**—SHOP PREMISES.—Estimates are required for mason, brick, joiner, plumber, plaster, slater, and rock asphalt works of building, consisting of shop premises and dwelling-house above, at Earlston. Schedules of quantities may be had, and plans seen, at the office of Mr. James M. Thomson, architect, 63, George-street, Edinburgh.

NO DATE.—**Kilkeel.**—HOUSES.—Tenders are invited for the erection of four dwelling-houses in Kilkeel, Co. Down, for Mr. Hugh O'Neill. For particulars apply to Mr. E. C. Page, architect, Kilkeel.

NO DATE.—**Sherborne.**—BOARDING-HOUSE.—Tenders are invited for building a new boarding-house, upon the Bradford-road, Sherborne, for the Directors of the Sherborne Ladies' College. Plans and specifications can be seen, and quantities obtained, upon application to the architects, Messrs. John Harding & Son, 58, High-street, Salisbury. Tenders are to be sent to Mr. E. W. Bartlett, Secretary, The Abbey Close, Sherborne.

ENGINEERING, IRON, AND STEEL.

OCTOBER 1.—**Matlock Bath.**—CAST-IRON PIPES.—The Gas Committee of the U.D.C. of Matlock Bath and Scarthin Nick invite tenders for the supply and delivery at Matlock Bath Station of 6-in., 8-in., 12-in., and 15-in. cast-iron pipe mains and special castings. Approximate quantity 110 tons. Copies of specifications, quantities, etc., can be had, on payment of 1l. 1s. deposit, from Mr. Wm. Jaffrey, Engineer and Manager, Council Chambers, Matlock Bath, to whom tenders, marked "Tender for Gas Mains," must be lodged not later than October 1 by 12 noon.

OCTOBER 5.—**Lower Gornal.**—ROTARY WASHER SCRUBBER.—Sedgley U.D.C. invite tenders for supplying a rotary washer scrubber, capable of dealing with 250,000 cubic ft. of gas per day, such scrubber to be delivered, erected, and completed for use at the Gasworks, Lower Gornal. Particulars may be obtained on application to the Engineer, at the works. Sealed tenders, marked "Washer Scrubber," must reach Mr. Joseph Smith, Clerk, 26, High Holborn, Sedgley, not later than the first post on October 5.

OCTOBER 11.—**Belfast.**—UNDERGROUND CONVENIENCE.—The Police Committee invite tenders for the construction of an underground convenience in Donegall-square North. Drawings, specification, and form of tender may be obtained in the City Surveyor's Office on payment of 1l. 1s. Tenders, endorsed "Underground Convenience," to be lodged in office of Sir Samuel Black, Town Clerk, before 10 o'clock on October 11.

OCTOBER 15.—**Coventry.**—COAL CONVEYORS, ETC.—The Gas Committee of the Coventry Corporation invite tenders for the manufacture, supply, and erection, at their Foleshill Works, of the following coal-conveying plant:—Two gravity bucket conveyors, each about 830 ft. long and capacity of 40 tons per hour; two short tray conveyors, each about 36 ft. long and of similar capacity; one large four-roll coal breaker of capacity of 60 tons large coal per hour; high-pressure steam engines, for driving the breaker and conveyors; one 15-ton capacity receiving hopper, together with steelwork, etc., for carrying breaker, etc. Drawings, specification, and form of tender may be obtained on payment of 1l. 1s. Sealed tenders, addressed to the Chairman of the Gas Committee, Gasworks, Coventry, endorsed "Tender for Coal Conveyors, etc.," must be delivered not later than 9 a.m., October 15.

OCTOBER 15.—**Coventry.**—HYDRAULIC PLANT.—The Gas Committee of the Coventry Corporation invite tenders for the manufacture, supply, and erection at their Foleshill Works of the following hydraulic plant:—two waggon-tipping machines; one direct-acting hydraulic lift; two 1-ton capstans and snatch heads; one set of high-pressure steam pumps; one accumulator, etc.; connecting pipes, valves, etc. Drawings, specification, and form of tender may be obtained on payment of 1l. 1s. Sealed tenders, addressed to the Chairman of the Gas Committee, Gasworks, Coventry, endorsed "Tender for Hydraulic Plant," must be delivered not later than 9 a.m., October 15.

OCTOBER 17.—**Accrington.**—PUMPING ENGINE.—The Accrington District Gas and Water Board invite tenders for a compound condensing deep well pumping engine. Copies of specification and plans may be obtained on application to Mr. C. Harrison, General Manager, at the Board's Offices, Accrington, on payment of 5l. Tenders to be endorsed and addressed to the Clerk of the Gas and Water Board, Town Hall, Accrington, and delivered before noon on October 17.

OCTOBER 20.—**Haverfordwest.**—RECONSTRUCTION OF MEAT MARKET.—The Corporation invite tenders for the reconstruction of the Meat Market, including new steel roof with elliptical lattice-braced principals, etc. The drawings and specifications may be inspected at the Council Chamber, High-street, Haverfordwest, between 10 a.m. and 5 p.m., or at the office of Mr. J. Preece James, architect, Tenby. A deposit of 2l. 2s. will be required. Tenders, sealed and endorsed "Reconstruction of Market," on the forms supplied, are to be sent to Mr. R. T. P. Williams, Town Clerk, Haverfordwest, on or before October 20.

MISCELLANEOUS.

OCTOBER 3.—**London.**—TIMBER.—The Directors of the Great Western Railway invite tenders for the supply of English ash butts and planks; elm butts, planks, and boards; and poplar planks. Specification, with form of tender, may be obtained on application to Mr. G. K. Mills, Secretary, Paddington Station, London, by whom tenders, endorsed "Tender for Timber," will be received not later than 10 a.m. on October 3.

OCTOBER 3.—**Stoke-upon-Trent.**—FURNISHING.—The Guardians of Stoke-upon-Trent Union invite tenders for the supply of furniture, seating, and other articles required in furnishing the administrative block at the Workhouse, in accordance with specification prepared by Mr. A. P. Miller, architect, Hanley. Forms of tender, with specification of particulars, may be obtained at the offices of Mr. C. Daniel, Clerk to the Guardians, Union Offices, Stoke-upon-Trent, to whom tenders, marked "Administrative Block," must be sent on or before October 3, not later than 9 a.m.

OCTOBER 3.—**Thames Ditton.**—STEAM ROLLING.—The U.D.C. of Esher and the Dittons invites tenders for the hire of a 10-ton steam roller and Morrison scarifier for road repairs in the urban district. Forms of application and further particulars can be obtained from Mr. A. J. Henderson, the Council's Surveyor. Tenders, endorsed "Hire of Steam Roller and Scarifier," to be addressed and delivered to Mr. E. A. Everett, Clerk to the Council, Council Offices, Portsmouth-road, Thames Ditton, Surrey, on or before noon of October 3.

OCTOBER 4.—**Blaydon.**—SCAVENGING, ETC.—The Blaydon U.D.C. invite tenders for the removal and disposal of contents of ashpits, house refuse, etc., at Spen, Barlow, High Thornley, etc. Specification, form of tender, and full particulars may be obtained from Mr. Robert Biggins, Sanitary Inspector, at the Offices of the Council, Blaydon-on-Tyne, between the hours of 9 a.m. and 10 a.m. Sealed tenders, on form provided, endorsed "Tender for Scavenging Contract," are to be delivered to Mr. Henry Dalton, Clerk, Blaydon-on-Tyne, before noon on October 4.

OCTOBER 4.—**Cork.**—WELL SINKING, ETC.—Cork R.D.C. invite tenders for sinking wells and erecting pumps, according to specifications, at (*a*) Barnagore, Ovens; (*b*) Monfieldstown, near Rochestown; (*c*) Rathpeacon. Forms of tender can be obtained, and specifications inspected, at the Board-room, Cork Workhouse. Tenders will be received up to 12 noon on October 4.

OCTOBER 8.—**Barrow-in-Furness.**—FISH STALLS.—The Corporation invite tenders for the erection and completion of fish stalls adjoining the Butter Market. Particulars, bills of quantities, and forms of tender may be obtained upon application at the office of the Borough Engineer and Surveyor. Sealed tenders, addressed to the Chairman of the "Markets Committee," and endorsed "Tender for Fish Stalls," must be delivered at the office of Mr. C. F. Preston, Town Clerk, Town Hall, Barrow-in-Furness, not later than 12 noon on October 8.

OCTOBER 8.—**Broadstairs.**—STEAM ROLLING.—Broadstairs and St. Peter's U.D.C. invite tenders for steam rolling and scarifying required in connexion with the repair of roads within their district for the ensuing twelve months. Particulars and form of tender may be obtained on application to Mr. Howard Hurd, C.E., Town Surveyor, Broadstairs. Sealed tenders, endorsed "Steam Rolling and Scarifying," must be delivered at the office of Mr. Lionel A. Skinner, Clerk of the Council, Council Offices, Broadstairs, by 12 noon on October 8.

OCTOBER 9.—**East Ham.**—DEMOLITION WORK.—East Ham T.C. invite tenders for the demolition and removal of materials and clearing of site of old houses (Nos. 501-519 odd inclusive), High-street North, East Ham, in accordance with specification and general conditions of contract, which may be seen, and copies of tender obtained, on application to the Borough Engineer, Mr. A. H. Campbell, M.Inst.C.E., Town Hall, East Ham. Tenders to be delivered, addressed to "The Chairman of the Works Committee, Town Hall, East Ham, E.," not later than 12 o'clock noon on October 9, and endorsed "Demolition of Old Buildings."

OCTOBER 13.—**Ipswich.**—SCHOOL FURNITURE.—The Education Committee invite tenders for the supply of (*a*) cupboards and (*b*) desks and other furniture for the Clifford-road and Ranelagh-road Council schools. The tenders must be separate for (*a*) and (*b*), and for each school, and cupboards only may be tendered for, and tenders may be for one school only, if desired. Specifications and information may be obtained from the Committee's Surveyor (Mr. E. T. Johns, Tower Chambers, Tower-street, Ipswich) on deposit with him of 10s. Tenders, endorsed, to be sent to Mr. J. Hepburn Hume, Secretary, Tower House, Tower-street, Ipswich, on October 13.

NO DATE.—**Hull.**—REMOVAL OF MINING PIER.—Tenders are invited for taking down and removing the damaged submarine mining pier at Paull Point Battery, near Hull. Specifications, tender forms, and any particulars can be obtained on application to the Commanding Royal Engineer, Newcastle, 13, Belle Grove-terrace, Newcastle-on-Tyne.

PAINTING, etc.

OCTOBER 1.—**Close Hill.**—PAINTING.—Close Hill Industrial Society, Ltd., invite tenders for painting outside of sixteen cottages and stables at Close Hill. Specifications can be seen at the Stores. Tenders to be in by October 1.

OCTOBER 1.—**Hull.**—PAINTING, ETC.—The Guardians of the Sculcoates Union invite tenders for painting, etc., at the Relief Station, St. George's-road, Hull. Forms of tender and all particulars can be obtained, or will be sent by post, on application to Mr. J. H. Wild, solicitor, Clerk to the Guardians, Union Offices, Harley-street, Hull, to whom tenders must be sent not later than 10 o'clock a.m., October 1.

OCTOBER 1.—**Margate.**—PAINTING.—The Water Works Committee invite tenders for the painting of the external wood and iron work, and the colouring of the rough cast work at the Wingham Pumping Station. Specification can be seen, and particulars obtained, at the Borough Surveyor's Office, Municipal Buildings, Margate. Tenders, under cover, endorsed "Painting," to be sent to Mr. Edward Brooke, Town Clerk, Town Clerk's Office, 18, Cecil-square, Margate, not later than 1 o'clock on October 1.

OCTOBER 2.—**Keighley.**—PAINTING.—Keighley and Bingley Joint Hospital Board invite tenders for painting the inside of the last erected scarlet fever pavilion at the Isolation Hospital, Morton Banks, Keighley. Specifications and bill of quantities may be obtained from Messrs. Moore & Crabtree, architects, York-chambers, Keighley. Sealed tenders, endorsed "Tender for Painting," to be received by Mr. Geo. E. Spencer, Clerk to the Joint Board, Keighley, not later than October 2.

OCTOBER 4.—**Bristol.**—PAINTING.—Tenders are invited for the painting of a portion of the City Estates. Specifications and conditions of contract can be obtained, on payment of 1l. 1s., from Mr. Peter Addie, City Valuer, Council House, Bristol, to whom tenders are to be delivered, endorsed "Tenders for Painting," not later than 10 a.m., October 4.

OCTOBER 4.—**Sunderland.**—PAINTING.—The Corporation of Sunderland invite tenders for the outside painting, etc., of Harrison's-buildings, Hat Case Area. Specifications may be seen, and form of tender obtained, at the Borough Surveyor's Office, Town Hall. Sealed tenders, addressed "To the Chairman of the Health Committee," and endorsed "Tender for Painting, etc., Harrison's-buildings, Hat Case Area," must be delivered at the Town Clerk's Office, Town Hall, Sunderland, before 12 o'clock noon on October 4.

OCTOBER 8.—**Dundalk.**—PAINTING.—The Directors of the Great Northern Railway Company (Ireland) invite tenders for the painting of the following girder bridges:—(1) The Carrickmacross-road Bridge at Dundalk Station; (2) Ardee-road Bridge over Barrack-street Branch at Rail Yard, Dundalk; (3) Hill-street Bridge, Dundalk; (4) Underline Bridge on Howth Tramway, G.N.R. (I.), at Howth Station. Specification can be seen at the office of Mr. W. H. tary, Secretary's Office, Amiens-street Terminus, Dublin, or copy at office of the District Engineer, Belfast; and forms of tender can be obtained at either places on payment of 1s. each. Tenders, made out separately for each of the four contracts, and on forms supplied, endorsed "Tender for Painting," should be lodged with Mr. T. Morrison, Secretary, Secretary's Office, Amiens-street Terminus, Dublin, not later than 10 a.m. on October 8.

OCTOBER 11.—**King's Lynn.**—PAINTING, ETC.—The Guardians of the King's Lynn Union invite tenders for (1) cleaning and washing down kitchen walls and ceiling; (2) cleaning, colouring, and painting upper ward and staircase male infirmary. Specifications to be seen at the Workhouse. Tenders to be sent to Mr. R. C. Coulton, Clerk to the Guardians, Lynn, on or before October 11.

ROADS, SANITARY, AND WATER WORKS.

OCTOBER 1.—**Dublin.**—PAVING.—The Paving Committee of the Dublin Corporation invite tenders for Jarrah wood paving blocks supplied and laid to the Corporation's foundation, the quantity to be about 806 yds., in Tara-street. The dimensions of the blocks to be 3 in. by 7 in. by 5 in. Tenders, addressed to the Chairman, Paving Committee, City Hall, Dublin, and endorsed "Tenders for Jarrah

Wood Blocks," to be received by Mr. Patrick Tobin, Secretary, Paving Committee, City Hall, Dublin, not later than October 1, at or before 4 p.m.

OCTOBER 1.—**Frimley.**—ROAD WORKS.—Frimley U.D.C. invite tenders for the ballasting and metalling of 7¼ miles of roads in their district. Plans, sections, and specifications may be seen, and copies of quantities and form of tender obtained from the Engineer and Surveyor, Mr. T. Clement Jones, C.E., Municipal Offices, Camberley, on payment of 2l. 2s. Sealed tenders, giving the names and addresses of two sureties, are to be delivered at office of Mr. F. T. S. Marsh, Clerk to the Council, Municipal Offices, Camberley, endorsed "Tender for Reconstruction of Roads," not later than noon on October 1.

OCTOBER 1.—**Hutton.**—STONEWARE SEWER.—Billericay R.D.C. invite tenders for the construction of about 400 yds. of stoneware sewer in the Parish of Hutton. Plans and specifications may be seen at the Offices of the Council's Engineers, Messrs. Jones, Parliament Mansions, Victoria-street, Westminster, S.W., where bills of quantities and forms of tender may be obtained, upon payment of 3l. 3s. Sealed tenders, on the form and in the envelope provided, must be delivered at the office of Mr. C. Edgar Lewis, Clerk to the Council, New-road, Brentwood, not later than 12 o'clock noon on October 1.

OCTOBER 1.—**Rollesby.**—ALTERATIONS TO DRAINS.—The Guardians of East and West Flegg Poor Law Incorporation invite tenders for alteration to the drains at Workhouse, Rollesby, Great Yarmouth. Plans and specifications may be seen at the Workhouse on application to the Master at any time between the hours of 10 a.m. and 4 p.m. Tenders to be sent to the Master at Rollesby Workhouse by 12 o'clock noon on October 1, endorsed "Tenders for Drainage Works."

OCTOBER 2.—**Ealing.**—PRIVATE STREET IMPROVEMENTS.—The Town Council of this Borough invite tenders for the making-up of Lyncroft-gardens and parts of Wolverton-gardens, King's-road, and St. Kilda-road. The drawings and specification may be seen, and form of tender, together with schedule of quantities and other particulars, obtained from Mr. Charles Jones, M.Inst.C.E., Borough Engineer, Town Hall, Ealing, W., any day during office hours, upon payment of a deposit of 10s. 6d. for each road. Sealed tenders, in the envelopes provided, and endorsed, must be delivered at office of Mr. Geo. E. Brydges, Town Clerk, Town Clerk's Office, Town Hall, Ealing W., not later than 9.30 a.m. on October 2.

OCTOBER 2.—**Handsworth.**—STREET WORKS.—The Handsworth U.D.C. invite tenders for street improvement works in Wellington-road. All particulars may be obtained on application to Mr. H. Richardson, A.M.Inst.C.E., Surveyor to the Council, Council House, Handsworth, Birmingham, to whom sealed tenders, endorsed "Wellington-road Improvement," are to be delivered on or before October 2.

OCTOBER 3.—**Beeston.**—PRIVATE STREET WORKS.—Beeston U.D.C. invite tenders for making-up private streets at Beeston, known as Trafalgar-road, Victory-road, and Rylands-road. Plans may be seen, and specification and quantities obtained, from the Surveyor, Public Offices, Beeston, on payment of a deposit of 2l. 2s. Sealed tenders, endorsed "Tender for Private Street Works," to be sent to Mr. W. H. Redgate, Clerk, Public Offices, Beeston, not later than October 3.

OCTOBER 3.—**Bury.**—PIPE LAYING.—Bury and District Joint Water Board invite tenders for cutting and refilling track for, and laying and jointing, about 4,500 lin. yds. of 6-in. diameter cast-iron pipes, from Ringley-road, Outwood, to Prestolee; and other relative works. Particulars, specification, and form of tender may be obtained from the Manager, Mr. R. B. Rigby, Parsons-lane, Bury. Copies of specification and bills of quantities will be provided on payment of a deposit of 1l. Tenders, endorsed "Tender for Pipe Laying," must be delivered at the office of Mr. John Haslam, Clerk to the Board, Bank-street, Bury, not later than October 3.

OCTOBER 3.—**Elstree.**—SURFACE-WATER SEWER.—The County Highways Committee of the Middlesex C.C. invite tenders for the construction of 2,800 ft. of 9-in. surface-water sewer, with inspection chambers, etc., along the main road, Elstree, in the county of Middlesex. Plans and specifications may be seen, and form of tender obtained, at office of Mr. H. T. Wakelam, M.Inst.C.E., County Engineer, Middlesex Guildhall, Westminster, S.W., upon payment of a deposit of 2l. 2s. Sealed and endorsed tenders to be sent to Sir Richard Nicholson, Middlesex Guildhall, Westminster, not later than 12 o'clock noon on October 3.

OCTOBER 3.—**Ticehurst.**—SEWERS, ETC.—Ticehurst R.D.C. invite tenders for the construction of about 155 lin. yds. of 6-in. and 9-in. sewers, with necessary manholes and junctions, at Church-street, Ticehurst. Plans and specifications can be seen at the office of Mr. W. E. Mitchener, Sanitary Inspector, Hurst Green. Sealed tenders should be sent to the office of Mr. J. C. Lane Andrews, Clerk, Council Offices, Wadhurst, not later than October 3.

OCTOBER 3.—**Willington Quay.**—SEWERAGE PIPES, ETC.—Willington Quay U.D.C. invite tenders for laying about 260 yds. of 24-in. 21-in., and 9-in. pipes, with manholes, junctions, etc. Plans and specifications may be seen on application to the Surveyor, Mr. J. Fleming Davidson, at the Council Office, Willington Quay. Tenders, endorsed "Tender for Sewerage," are to be delivered to Mr. W. S. Daglish, Clerk, 28, Sandhill, Newcastle-upon-Tyne, before noon on October 3.

OCTOBER 4.—**Cork.**—LAYING OF SEWERS.—Cork R.D.C. invite tenders for execution of the following works, according to specifications, which may be inspected at the Board-room, Cork Workhouse, viz.:—(*a*) Laying sewer at Toureen, Passage West; (*b*) laying water-pipes at Ballyfouloo, Monkstown; (*c*) repairing pump at Currabinny. Tenders will be received up to 12 o'clock noon on October 4.

OCTOBER 4.—**Preesall.**—TRIAL BORINGS.—The U.D.C. of Preesall-with-Hackinsall invite tenders for trial borings in various parts of their district. Particulars may be obtained from the engineer, Mr. Walter J. Lomax, A.M.Inst.C.E., 11, Fold-street, Bolton. Sealed tenders, endorsed "Preesall Sewerage," to be in the hands of Mr. Jos. Cumming, Clerk to the Council, Council Offices, Preesall, near Preston, not later than October 4.

OCTOBER 4.—**Woolston.**—PAVING.—Itchen U.D.C. invite tenders for providing and laying complete Coverack syenitic concrete paving in four roads in Woolston, near Southampton. Plans and particulars may be seen between the hours of 10 a.m. and 11 a.m. at the Council's Surveyor's Office, Portsmouth-road, Woolston. Sealed tenders, endorsed "Tender for Paving," to be sent to Mr. W. Henry Bell, Clerk to the Council, Bridge-road, Woolston, near Southampton, on or before 12 o'clock noon on October 4.

OCTOBER 5.—**Ashby.**—ROADS AND SEWERS.—Tenders are invited for the construction of roads and laying of sewers at Ashby, in the County of Lincoln. Plans and specifications may be seen at the office of Mr. W. H. Buttrick, surveyor, Scunthorpe, to whom sealed and endorsed tenders are to be delivered not later than 12 o'clock noon on October 5.

OCTOBER 6.—**Leeds.**—PRIVATE STREET WORKS.—The Highways Committee invite tenders for the paving and flagging of certain streets. Drawings may be seen at the City Engineer's Office, Municipal Buildings. Forms of tender and bills of quantities may be obtained, and copies of the documents forming the contract inspected, on application at the Highways Office, 155, Kirkstall-road. Sealed tenders, endorsed "Tender for Private Street Works," and addressed to the Highways Committee, must be delivered at the Town Clerk's Office, Town Hall, Leeds, not later than 10 a.m. on October 6.

OCTOBER 6.—**Lichfield.**—ENLARGEMENT OF SEWAGE WORKS.—The Sanitary Committee of the Lichfield C.C. invite separate tenders for the following works:—(*a*) Excavating and forming two filter-beds, making and erecting wood carrier, on brick piers; alteration of humus tanks, including brickwork, cast-iron pipes and valves, building sludge chamber, with elevator, etc., at the Sewage Works, Curborough, Lichfield. (*b*) Providing and fixing over the said filter-beds two complete sets of galvanized iron tubing to form fixed spray distributors. (*c*) Erection of workmen's houses, near to the above works. Plans of the above-mentioned works may be seen, specifications, forms of tenders, and other particulars obtained, on application to Mr. Emerson Brooke, City Surveyor, Lichfield. Sealed tenders, separately endorsed, to be sent in to Mr. Herbert Russell, Town Clerk, Lichfield, on or before October 6.

✱ OCTOBER 8.—**Camberwell.**—KERBING, ETC.—The Borough Council invite tenders for kerbing, channelling, foundations for asphalt paving, road work, and drainage work in Royal Oak-place, Forest Hill-road. Specification and form of tender can be had from the Borough Engineer, Town Hall, Camberwell. Tenders to be delivered on or before 6.30 p.m., October 8.

OCTOBER 8.—**Prestolee.**—PRIVATE IMPROVEMENT WORKS.—The Bury R.D.C. invite tenders for surface-water draining, forming, ballasting, kerbing, flagging, and paving for a length of 230 yds. or thereabouts at Prestolee, Outwood. Plans, sections, and specification can be seen, and quantities obtained, upon payment of 2l. 2s., on and after October 1, at the Union Offices, Bury. Tenders to be endorsed "Private Street Improvement Works," and delivered to Mr. James Isherwood, Solicitor, Clerk to the Council, Union Offices, Bury, before 10 o'clock on October 8.

OCTOBER 8.—**Rothes.**—CAUSEWAY.—Estimates wanted for laying granite or whinstone causeway at eleven crossings within the Burgh. Specifications may be seen with Mr. Archd. Robb, Burgh Surveyor. Offers must be lodged with Mr. G. A. Cumming, Town Clerk, Burnside-street, Rothes, not later than 6 p.m. on October 8.

OCTOBER 8.—**Salisbury.**—ROAD AND SEWER ALTERATIONS.—Tenders are invited for the reconstruction and widening of St. Mark's-avenue, the construction of sewers, surface-water drains, manholes, gullies, and other incidental works for the Ecclesiastical Commissioners and their surveyors, Messrs. Clutton, 5, Great College-street, Westminster Abbey, London, S.W. Plans, specification, and conditions of contract, prepared by Messrs. Lemon & Blizard, MM.Inst.C.E., engineers for the works, may be inspected at their Salisbury office, and copies of bills of quantities obtained on depositing 2l. 2s. Sealed tenders to be sent to Engineers' Office, 29, Market-place, Salisbury, on or before October 8, before 5 p.m.

OCTOBER 8.—**Skipton.**—STREET WORKS.—Skipton U.D.C. invite tenders for the excavating, paving, and completing of the pavements in High-street, Skipton. Plans and specification may be seen, and schedule of quantities obtained, on application to Mr. John Mallinson, Engineer and Surveyor to the Council, at his offices in the Town Hall, Skipton, on payment of 1l., to whom sealed tenders, endorsed "High-street Improvement," are to be sent not later than October 8.

OCTOBER 9.—**Dewsbury.**—PRIVATE STREET PAVING.—The Dewsbury Corporation invite tenders for the paving, flagging, etc., of John-street, off Leeds-road. Plans, specifications, etc., may be seen, and forms of tender obtained, on application to the Borough Surveyor's Office, Town Hall, Dewsbury. Tenders, under sealed cover, endorsed "Private Street Paving," must be delivered to Mr. H. Ellis, Town Clerk, Town Hall, Dewsbury, not later than 9 o'clock on October 9.

OCTOBER 9.—**London.**—ROAD WIDENING.—The L.C.C. invites tenders for the execution of certain works in connexion with the widening of the Lower Richmond-road at the southern approach to Putney Bridge, in the Metropolitan Borough of Wandsworth. These comprise the demolition of the existing parapet wall and end walls of arches on the riverside of the footway and the removal of a portion of the present roadway, etc., surfaces; the construction of a new retaining wall and parapet; the extension of the brick arches beneath the roadway; and paving and other works. Drawings, specifications, bills of quantities, form of tender, and other particulars may be obtained upon application to the Chief Engineer, Mr. Maurice Fitzmaurice, C.M.G., at the County Hall, Spring-gardens, S.W., upon payment to the Cashier of the Council of 3l. Tenders must be on the official forms, to be delivered at the County Hall in a sealed cover, addressed to "The Clerk of the London County Council, Spring-gardens, S.W.," and marked "Tender for Alterations to Putney Bridge, Southern Approach," by 10 o'clock a.m. on October 9.

OCTOBER 10.—**Stockport.**—CONSTRUCTION OF SEWERS, ETC.—The Highways and Sewers Committee invite tenders for the manual and team labour and materials required in the construction of about 1,360 lin. yds. of egg-shaped sewers, varying in size from 3 ft. by 2 ft. to 4 ft. by 2 ft. 8 in.; 100 lin. yds. of cast-iron pipe sewers, 15 in. and 21 in. in diameter; and 6,120 lin. yds. of stoneware pipe sewers, varying from 12 in. to 36 in. diameter; together with all manholes and ventilators; the construction of a small detritus tank and screening chamber, and other incidental works for the sewerage of the added areas of Cheadle and Bramhall. Plans, sections, and details may be seen, and conditions, specifications of works and materials, bills of quantities, form of tender, etc., may be obtained, from Mr. John Atkinson, A.M.Inst.C.E., Borough Surveyor, Borough Surveyor's Office, Stockport, on payment of a deposit of 3l. 3s. Tenders, addressed "The Borough Surveyor, Stockport," sealed and endorsed "Tender for Sewers in Added Areas of Cheadle and Bramhall," to be delivered at or before noon on October 10.

OCTOBER 11.—**Rawtenstall.**—SEWER PIPES, ETC.—The Corporation of Rawtenstall invite tenders for the construction in Cowpe-road, Haslingden New-road, and Newchurch Old-road of 12-in. earthenware and cast-iron pipe sewers; together with manholes, lampholes, and other works in connexion therewith. Plans may be seen, and specifications, bills of quantities, and forms of tender obtained, on and after September 29, on application to Mr. James Johnson, C.E., Borough Surveyor, Municipal Offices, Rawtenstall, on payment of 2l. 2s. Sealed tenders, accompanied by the priced quantities, endorsed "Tender for Main Sewers, Contracts Nos. 8, 9, and 10," to be addressed to Mr. James Whalley, Town Clerk, Municipal Offices, Rawtenstall, and sent in not later than 9 a.m. on October 11.

OCTOBER 11.—**Southend-on-Sea.**—MAKING-UP STREETS.—The Corporation invite tenders for the making-up of the following streets:—Maldon-road, Station-avenue, Leonard-road, Cranley-road, and parts of Ambleside-drive, Cossington-road, Elderton-road, Cranley-avenue, and Beach-road. Plans, sections, and specifications may be seen, and bills of quantities and forms of tender obtained, on and after October 1 (on deposit of cheque for 1l. 1s. in respect of each street), upon application to Mr. E. J. Elford, M.Inst.M.E., Borough Surveyor. Sealed tenders (each street on separate form), endorsed with the name of the street, and marked "Tender for Private Street Works," to be delivered at office of Mr. William H. Snow, Town Clerk, Town Clerk's Office, Southend-on-Sea, before 5 o'clock p.m. on October 11.

✱ OCTOBER 15.—**East Grinstead.**—DUSTLESS ROAD.—The Owners of the Marriott Estate invite tenders for the construction of a new dustless road at East Grinstead, according to plans and specifications to be seen at Messrs. Hasties, 65, Lincoln's Inn-fields, W.C., any week-day (except Saturdays), between 11 and 4. Copies of the specification and form of tender can be obtained on payment of 1l. 1s. Tenders should be addressed to Messrs Hasties, 65, Lincoln's Inn-fields, London, W.C., and delivered before 4 p.m., October 15.

OCTOBER 22.—**Evesham.**—STONEWARE PIPE SEWERS.—Evesham R.D.C. invite tenders for the provision, laying, and jointing of stoneware pipe sewers, together with manholes and lampholes, also the construction of liquefying tank, bacteria filters, and other incidental works, in accordance with drawings and specification prepared by the engineers. Drawings and specification may be seen, and bills of quantities and form of tender obtained, at the offices of the engineers, Messrs. Willcox & Raikes, 63, Temple-row, Birmingham, on or after October 2, on payment of a deposit of 3l. 3s. Sealed tenders, in envelopes supplied, endorsed "Badsey Sewerage—Contract No. 1," to be delivered at office of Mr. Edward Wadams, Clerk to the Council, Union Offices, Evesham, not later than 12 noon on October 22.

NOVEMBER 3.—**Bolton-upon-Dearne.**—SEWAGE WORKS.—Bolton-upon-Dearne U.D.C. invite tenders for the construction of 6,300 yds. of 8-in. iron and 9-in. stoneware pipe sewers, together with manholes, lampshafts, and all appurtenant works, and erection of No. 2 septic tanks, bacteria beds, carriers, laying-out disposal site, etc., at Bolton-upon-Dearne, Yorkshire. The plans may be seen, and quantities and form of tender obtained, on or after October 1, at the office of the engineer, Mr. W. H. Radford, C.E., Albion Chambers, King-street, Nottingham, on deposit of 3l. 3s. A copy of the plans may also be seen at the Surveyor's Office, Station-road, Bolton-upon-Dearne. Tenders to be sent to Mr. J. Ledger Hawksworth, Clerk to the Council, Council Offices, Station-road, Bolton-upon-Dearne, Rotherham, on or before November 3, endorsed "Sewer."

NO DATE.—**Brixworth.**—SEPTIC TANK, ETC.—Erection of a septic tank, filter, sewers, and other works on the Spratton Filtration Area, for the R.D.C. of Brixworth. Names to Mr. Arthur Lewis, surveyor, Hill Side, Brixworth. Quantities supplied.

NO DATE.—**Stourbridge.**—PAVING.—Stourbridge U.D.C. invite tenders for providing and laying 400 yds. or thereabouts of 2-in. artificial stone paving. For particulars apply to Mr. F. Woodward, Surveyor, Town Hall, Stourbridge.

STONE, MATERIALS, AND STORES.

OCTOBER 1.—**Sandgate.**—HIGHWAY MATERIALS.—The Sandgate U.D.C. invite tenders for the supply of various highway materials, to be delivered at the cost of the contractor, on or before November 30 next. Forms of tender may be had upon application to Mr. J. Shere Atkinson, Clerk to the Council, Council Offices, 51, High-street, Sandgate, to whom tenders must be sent, marked "Tender for Highway Materials," not later than October 1.

OCTOBER 2.—**Felixstowe.**—GRANITE AND STEAM ROAD ROLLING.—Felixstowe and Walton U.D.C. invite tenders for the supply of Guernsey granite, delivered free, alongside at Felixstowe Dock. Tenders are also invited for steam road rolling. Specifications

and forms of tender may be obtained on application to Mr. H. Clegg, A.M.Inst.C.E., Surveyor to the Council, Town Hall, Felixstowe. Tenders should be delivered not later than first post on October 2.

OCTOBER 2.—**India.**—RAILWAY STORES.—The Secretary of State for India in Council invites tenders for the supply of (1) rails and fishplates; (2) bearing plates for rails; (3) dog spikes; (4) 100 and 150 ft. spans. The conditions of contract may be obtained on application to the Director-General of Stores, India Office, Whitehall, S.W., and tenders are to be delivered at that office by 2 p.m. on October 2.

OCTOBER 3.—**Weybridge.**—MATERIALS, CARTAGE, ETC.—U.D.C. of Weybridge invite tenders for the supply of materials, as may be required, of the following kinds:—2-in. broken Clandon chalk flints; 2½-in. Quenast granite; Farnham Fino gravel screenings. Team labour and cartage, and the hire of a 10-ton steam road roller, that may be required in the year ending September 30, 1907. Particulars and forms of tender may be obtained on application to Mr. John S. Crawshaw, Surveyor to the Council, at the Council Offices, Weybridge. Sealed and endorsed tenders to be sent not later than 6 o'clock p.m. on October 3, addressed to Mr. Robert Ellwood, Clerk to the Council, Council Offices, Weybridge.

OCTOBER 8.—**Broadstairs.**—ROAD MATERIALS.—Broadstairs and St. Peter's U.D.C. invite tenders for the following:—(1) Supplying and delivering 1,400 ft. run of 6-in. by 12-in. granite kerbing (straight), 50 ft. ditto (circular), and 650 ft. run of 12-in. by 6-in. granite channel; (2) supplying and delivering 250 tons of broken basalt or granite macadam, 1½-in. gauge; (3) 1,250 cubic yds. of broken pit flints. Sample truck of flints, carriage paid, to be sent to Broadstairs Railway Station, which will be paid for at the rate of the accepted tender. Those tendering for broken granite or basalt must forward a small sample of the material with their tender. Sealed tenders, on form to be obtained from Mr. Howard Hurd, C.E. Town Surveyor, endorsed, must be delivered to Mr. Lionel A. Skinner, Clerk of the Council, Council Offices, Broadstairs, not later than noon on October 8.

OCTOBER 8.—**Cowes.**—PORTLAND CEMENT.—The Cowes U.D.C. invite tenders for the supply of best quality Portland cement, to be delivered at the Town Quay, Cowes, I.W., in such quantities as may be required during the period ending September 29, 1907. Particulars may be obtained from Mr. J. N. Webster, Engineer and Surveyor to the Council. Sealed tenders, endorsed "Tender for Portland Cement," to be delivered at office of Mr. H. C. Damant, Clerk, High-street, Cowes, I.W., on or before October 8, not later than 4 p.m.

OCTOBER 8.—**Croydon.**—STORES.—Croydon Borough Council invite tenders for the supply of stoneware drain pipes of various sizes for one year from November 9 next. The Council invite tenders for the supply of stores for one year from November 9 next. Samples of the stores required for the Roads Department may be seen at the Corporation Roads Depôt, Factory-lane, Croydon, and the forms for tendering may be obtained at the Borough Road Surveyor's Office, Town Hall, Croydon. Samples of the stores required for the Sanitary and Waterworks Departments may be seen at the Waterworks Stores at Surrey-street, Croydon, and forms for tendering may be obtained at the Borough Engineer's Office, Town Hall, Croydon. Tenders, endorsed, to be sent to Mr. F. C. Lloyd, Town Clerk, Town Hall, Croydon, by 11 o'clock in the forenoon on October 8.

OCTOBER 8.—**Kingswinford.**—CAST-IRON PIPES.—Kingswinford R.D.C. invite tenders for the supply and delivery on the works, as may be required, of about 715 tons of cast-iron pipes, varying in size from 16 in. to 27 in. in diameter. Plans, detailed drawings, and form of contract may be seen, and specifications, schedules, and bills of quantities obtained, at the offices of the engineer, Mr. William Fiddian, F.S.I., Old Bank Offices, Stourbridge, on payment of 2l. 2s. Sealed tenders, endorsed "Tender for Kingswinford Sewerage, Contract No. 9," to be sent to Mr. George Francis James, Clerk to the Council, The Council Offices, Wordsley, Stourbridge, not later than noon, October 8.

OCTOBER 9.—**India.**—STORES, ETC.—The Board of Directors of the Southern Mahratta Railway Company, Ltd., invite tenders for:—(1) Miscellaneous tools and stores; (2) 1,000 brass boiler tubes, as per specifications and drawings, which may be seen at the offices of the Company. The charge for specification No. 1 is 10s. 6d., and for No. 2 1l. 1s. each, which will not be returned. Tenders, endorsed, must be sent in, addressed to Mr. Edw. Z. Thornton, Secretary, 46, Queen Anne's-gate, S.W., not later than 12 o'clock noon on October 9.

* OCTOBER 9.—**London.**—GRAVEL.—The London C.C. invites tenders for the supply and delivery of fine binding gravel at parks, gardens, and open spaces under its control. Specification, schedule of quantities, form of tender, etc., can be obtained at the Parks Department, 11, Regent-street, S.W. Tenders to be delivered at the County Hall, in a sealed cover, addressed to the Clerk of the London C.C., Spring-gardens, S.W., and marked "Tender for Gravel, Parks and Open Spaces," before 10 a.m., October 9.

OCTOBER 10.—**Crewe.**—IRONMONGERY, ETC.—The Education Committee of the Crewe Town Council invite tenders for the supply of ironmongery and cleaning materials, and also chandlery for the various schools in the borough. Forms of tender and copies of specifications may be obtained from Mr. Henry D. Struthers, Director of Education. Tenders, with samples, marked as such, to be sent in not later than October 10, at the Municipal Offices, Earle-street.

OCTOBER 10.—**India.**—RAILWAY STORES.—The East Indian Railway Company invite tenders for the supply and delivery of:—(1) Galvanised sheets, etc.; (2) laminated bearing springs, etc.; (3) spiral and volute springs; (4) steel axles for carriages and waggons; (5) steel tyres for carriages and waggons; (6) fittings for carriage and waggon underframes and buffers for locomotives; (7) brass boiler tubes; (8) inspection motor trolleys; (9) wheels and axles for waggons; (10) workshop machines, as per specifications to be seen at the Company's Offices. Tenders are to be sent to Mr. C. W. Young, Secretary, Nicholas-lane, London, E.C., not later than 12 o'clock noon, marked "Tender for Galvanised Sheets, etc.," or as the case may be, for Nos. 1 to 7, on October 3, and for Nos. 8 to 10 on October 10. For each specification a fee of 1l. 1s. is charged, which cannot be returned.

OCTOBER 13.—**Brigg.**—GRANITE.—Brigg U.D.C. invite tenders for the supply of 200 tons of granite, broken from 1½ in. to 2½ in., to be delivered free at Brigg Station (Great Central Railway). The granite must be delivered before the end of June next, in such quantities and at such times as may be required by the Council. Sealed tenders, addressed to the Brigg U.D.C., must be sent to Mr. G. S. Sowter, Clerk, Brigg, on or before October 13.

OCTOBER 18.—**Greenwich.**—GRANITE SPALLS.—Greenwich Union invite tenders for a cargo of about 350 tons Channel Island granite spalls for stone-breaking at the Grove Park Workhouse, Lee, S.E. Forms of tender can be obtained on application at the Clerk's Office, Woolwich-road, Greenwich, and must be delivered by noon on October 18.

NO DATE.—**Halifax.**—FILTERING MEDIUM.—The Highways Committee of the Halifax Corporation invite tenders for about 22,000 cubic yds. of filtering medium for bacteria beds at Copley. Particulars may be obtained on application to Mr. James Lord, C.E., Borough Engineer, Town Hall, Halifax, upon payment of 1l.

NO DATE.—**Warrington.**—LEAD PIPING.—The Water Committee invite tenders for the supply of a quantity of lead water piping. Particulars may be had from Mr. James Deas, Engineer, Municipal Offices, Warrington.

Auction Sales.

Nature and Place of Sale.	By whom Offered.	Date of Sale.
*BUILDER'S STOCK, PLANT, AND MACHINERY, DOVER—On the Premises	Worsfold & Hayward	Oct.
*BUILDER'S PLANT, ETC., WIMBLEDON-PARK, S.W.—On the Premises	Boyton, Sons, & Trevor	do.
*OLD BUILDING MATERIALS—Strand	Horne & Co.	do.
*JOINERY WORKS, HENRY-STREET, GRAY'S-INN-ROAD	May & Rowden	Oct. 3
*BUILDER'S STOCK, WANDSWORTH—On the Premises	J. T. Skelding	Oct. 9
*BRICKS, BRICK-MAKING PLANT, ETC., IPSWICH—At the Brooks Hall Brickyard	Garrod, Turner, & Son	Oct. 10
*NURSERY STOCK, SOUTH WOODFORD—On the Premises	Protheroe & Morris	Oct. 11, etc.
*FREEHOLD BUILDING SITE, ST. GEORGE'S-CIRCUS—At the Mart	Debenham, Tewson, & Co.	Oct. 16
*FREEHOLD PROPERTY, WILLESDEN—At the Mart	Debenham, Tewson, & Co.	Oct. 23
*BUILDING SITE, FULHAM—At the Mart	Farebrother, Ellis, & Co.	Oct. 25
*FREEHOLD BUILDING SITE, CITY OF LONDON—At the Mart	Edwin Fox & Bousfield	Oct. 31
*ANCASTER HOUSE ESTATE—At the Mart	Chancellor & Sons	October.

PATENTS.—*Continued from page 379*

other device. The bar is preferably of a length to extend through the wall or its other end may be so bent as to engage with the bricks. The bent end or equivalent part offers a positive resistance to the bar being drawn out endwise.

2,115 of 1906.—F. W. ADAMS: *Door Springs.*

This relates to a double-action door spring, comprising a casing, a spindle extending through the same, and adapted to be moved relatively therewith when the door is opened, a pair of sleeves loosely mounted upon the spindle and carrying a double helical spring, the ends of which are attached to the said two sleeves respectively, and means for turning either of the sleeves and holding the other against rotation when the door is opened.

8,627 of 1906.—R. J. CROWLEY and F. F. PAYNE: *Fireproof or Heat-resisting Surfacing Composition or Cement.*

This relates to a fireproof or heat-resisting surfacing composition or cement manufactured by grinding a fine powder and mixing with it corundum and graphite in certain proportions, and binding same with a solution of silicate of sodium.

3,351 of 1906.—A. SHARRATT: *Brick-making Machines.*

This relates to a brick-making machine having a pug ring provided with a loose inner lining, and consists in forming the said inner ring with both upper and lower edges thereof bevelled to form a knife edge.

6,263 of 1906.—F. H. PICKSTOCK: *Window Catch Protector.*

This relates to a device for securing the locking arm of sash fasteners, consisting of a bent bar lying adjacent thereto, and said bar having a socket which engages with a strut or boss projecting from a plate secured to the front of the wooden sash bar, and fastened removably thereto by a pin or nut, or in any other suitable way.

10,179 of 1906.—C. T. GANN: *Chimney and Ventilating Shaft Top.*

This relates to a chimney and ventilating shaft top, and consists of a square hood of galvanised iron or other suitable material provided with automatic flaps, the hood being riveted on to a piece of sheet-iron tubing tapered at the bottom end and square at the top to receive the hood. The said head has four wings, one on each angle which form recesses for the flaps, and serve to prevent the wind from acting upon the other flaps.

11,468 of 1906.—F. C. ROUSE and H. RUDDER: *Hinges for Doors and Gates.*

This relates to hinges for doors and gates, and consists in the provision of an adjustable hinge having a screwed part passing through a pivoting blank or bracket working in the eye-bolt or socket.

12,890 of 1906.—E. CRAVEN: *Water Heaters for Domestic and Similar Fireplaces or Grates.*

This relates to a domestic water heater adapted to be fitted to a kitchen or other similar domestic grate, the construction consisting of front and back horizontal pipes constituting distributing and draw-off pipes, provided with an inlet and outlet connexion, and a series of parallel pipes extending between and attached to the said pipes.

22,292 of 1905.—H. J. HACKINS: *Jointing Drain Pipes.*

This relates to jointing drain pipes, and consists in forming ribs, blocks, or spurs on the inner face of the socket, so as to project inwardly therein. The socket has at each end an inwardly projecting flange or curtain which does not extend so far from the internal face of the socket as do the ribs, blocks, or spurs above mentioned. Before jointing is completed the sockets are free to be slid axially over and on either side of the meeting planes of the pipe ends. This allows the pipes, when placed in the trench, to rest on the bottom of the trench, the part of the trench which receives the socket being hollowed out at the bottom to permit the socket to be slid axially. The abutting ends of the pipes, which are bevelled to allow for a small seal of gasket and clay, can be placed in true alignment, and the joints at the pipe ends are made round before the socket is slid in place. When the socket has been slid into place the joint is sealed with liquid cement, poured in through charging apertures in the socket, the cement being retained in the socket by the end flanges. The spurs between the pipe and the flanges are sealed with clay.

3,655 of 1906.—W. JEROCH and DEUTSCHE FERRIT-LENT GES. m.b.H.: *Manufacture of Cement.*

This relates to a magnesia cement, consisting of a dry powder containing magnesia and sulphate of magnesium, and also a salt of lead free from chlorine, such as acetate of lead, which can react with the magnesium compounds.

6,483 of 1906.—W. HENMAN: *Reinforced Girders, Beams, Railway Sleepers, and the like.*

This relates to girders and the like for use in reinforced concrete, and consists in providing a length or strip of metal having thickened or ribbed edges or centres, or both, with slits in opposite directions on each side of the longitudinal axis of the strip, and expanding the same to form a sheltered girder or beam.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

September 12.—By MADDISON, MILES, & MADDISON (at Yarmouth).

Runham, Norfolk.—Freehold market-gdn. and marshes, 9 a. 3 r. 5 p. £430
Stokesby, Norfolk.—Four freehold houses 305
Bradwell, Suffolk.—1 to 8, Gipsy-la., f..... 665

By NICHOLAS, DENYER, & Co. (at Denbigh).

Henllan, Denbigh.—Portions of the Croes Estate, 294 a., f. (in lots)..... 5,795

September 13.—By SIMMONS & SONS (at Farnham).

Bentley, Hants.—"Bury Court Farm," 410 a., f., p..... 4,850

By W. LUDLOW & BRISCOE (at Birmingham).

Danzey Green, Warwick.—Danzey Green Farm, 55 a. 0 r. 27 p, f., y.r. 72l. 18s. 9d. 1,600

September 18.—By BEALE & CAPPS.

Regent-street.—60, Warwick-st. (s.), and 39, Glasshouse-st. (s.), u.t. 11¼ yrs. g.r. 170l., y.r. 367l. 4s. 400
59, Warwick-st. (s.), u.t. 11¼ yrs., g.r. 70l., w.r. 188l. 6s. 380

By RUTLEY, SON, & VINE.

Hampstead road.—22, Ampthill-sq., u.t. 36½ yrs., g.r. 10l. 10s., p. 750
Somers Town.—43, Chalton-st. (s.), u.t. 30½ yrs., g.r. 9l. 10s., e.r. 55l 345
Islington.—87, Essex-rd. (s.), u.t. 18½ yrs., g.r. 30l., y.r. 70l. 400

By WYATT & SON (at Havant).

Havant, Hants.—6, Western-rd., f., y.r. 19l. 10s. 250

By NICHOLAS, DENYER, & Co. (at Ashford).

Kennington, Kent.—"Kennington Grange" and 5 acres, f..... 1,395
Four freehold cottages and 1 a. 2 r. 39 p. 635

By FURBERS' (at Hitchin).

Hitchin, Herts.—48, 49, and 50, Radcliffe-rd., f., y.r. 33l. 16s. 520
53 to 57, Dacre-rd., f., y.r. 57l. 10s. 6d. 810

September 19.—By PRICKETT & ELLIS.

Highgate.—18 and 20, Parolles-rd., u.t. 74½ yrs., g.r. 12l. 12s., y.r. 64l. 515

September 20.—By J. A. & W. THARP.

Leyton.—22 and 24, Park-rd., u.t. 27½ yrs., g.r. 10l., w.r. 44l. 4s. 200

September 21.—By INMAN & CRIER.

Maida Vale.—20 and 21, Elgin-ter., u.t. 55 yrs., g.r. 10l., w.r. 150l., 16s. 660

By MAY & PHILPOT.

Sydenham.—9, West-hill, f., y.r. 170l. 2,000

By NICHOLAS, DENYER & Co.

Kidmore, Oxon.—A freehold enclosure, 5 a. 0 r. 36 p. 395
"Cross Farm," 90 a. 0 r. 16 p., f. 1,850
"Tokers Field," 3 a. 0 r. 23 p., f. 170
Rotherfield Grays, Oxon.—Two freehold building sites, 37 a. 2 r. 36 p..... 1,510
Rotherfield Peppard, Oxon.—"Lion Meadow," 2 a. 1 r. 2 p., f. 335

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. beerhouse; p.h for public-house; o. for office; s. for shops; ct. for court.

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples, sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance. The Editor cannot undertake to read and consider articles offered for acceptance unless they are type-written.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER and not to the Editor.

MEETINGS.

FRIDAY, SEPTEMBER 28.

Royal Sanitary Institute.—Dr. A. Wellesley Harris on "Elementary Statistics." 7 p.m.

SATURDAY, SEPTEMBER 29.

Northern Architectural Association.—Students' Sketching Club excursion.

Institute of Sanitary Engineers.—Visit to Engineering and Machinery Exhibition at Olympia.

Incorporated Association of Municipal and County Engineers.—Home district meeting at Windsor. 11 a.m., assemble in the Guildhall; 12 noon, visit to Windsor Castle; 1.30 p.m., luncheon in the Guildhall; 2.30 p.m., drive by brakes to inspect various buildings; 5 p.m., at the Guildhall.

TUESDAY, OCTOBER 2.

Institute of Sanitary Engineers.—Student's class, 7 p.m.

WEDNESDAY, OCTOBER 3.

Institute of Sanitary Engineers.—Sessional meeting. Mr. W. Francis Goodrich on "The Romance of Waste." 8 p.m.

Provident Institution of Builders' Foremen and Clerks of Works.—Ordinary meeting of the members. 8 p.m.

Royal Sanitary Institute.—Dr. E. J. Steegmann on "Elementary Physics." 7 p.m.

THURSDAY, OCTOBER 4.

Royal Sanitary Institute.—Dr. E. J. Steegmann on "Elementary Physics." 7 p.m.

FRIDAY, OCTOBER 5.

Royal Sanitary Institute.—Dr. E. J. Steegmann on "Elementary Chemistry." 7 p.m.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, etc., 26s. per annum.

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PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks.....	1 10 0	per 1000 alongside, in river.
Rough Stocks and Grizzles	1 7 0	" " "
Picked Stocks for Facings	2 17 6	" delivered.
Flettons.....	1 8 0	" at railway depôt.
Red Wire Cuts ...	1 14 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing..	5 0 0	" " "
Best Blue Pressed Staffordshire ...	3 15 0	" " "
Do. Bullnose	4 0 0	" " "
Best Stourbridge Fire Bricks	3 14 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	12 0 0	" " "
Headers.....	11 0 0	" " "
Quoins, Bullnose, and Flats	16 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers ...	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End.....	20 0 0	" " "
Splays, Chamferred, Squints..	20 0 0	" " "
Best Dipped Salt Glazed Stretchers, and Header.	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers ...	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End.....	15 0 0	" " "
Splays, Chamferred, Squints..	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.
Thames and Pit Sand	7 0	per yard, delivered.
Thames Ballast	5 6	" "
Best Portland Cement	27 0	per ton, "
Best Ground Blue Lias Lime	19 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s. 6d.	per yard, delivered.
Stourbridge Fireclay in sacks	27s. 0d.	per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington Depôt.....	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf...	2 1	" "
White Basebed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf...	2 2½	" "
Ancaster in blocks.....	1 10	per ft. cube, deld. rly. depôt.
Ditto "	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks ...	2 4	" "
Red Corsehill " ...	2 2	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

Scappled random blocks.	2 10	" "
6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2 3	per ft. super., "
6 in. rubbed two sides ditto, ditto	2 6	" "
3 in. sawn two sides slabs (random sizes).....	0 11½	" "
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "

STONE (*continued*).

HARD YORK—	s. d.	
Scappled random blocks.	3 0	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 8	per ft. super., "
6 in. rubbed two sides ditto	3 0	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
	s. d.	
Hopton Wood (Hard Bed) in blocks	2 0	per ft. cube, deld. rly. depôt.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. sawn both sides random slabs	1 0	" "
" " " 2 in. do.	0 8½	" "

SLATES.

	£ s. d.	
In. In.		
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at r. d.
20×12 " "	13 17 6	" "
20×10 first quality "	13 0 0	" "
20×12 " "	13 15 0	" "
16×8 " "	7 5 0	" "
20×10 best blue Portmadoc	12 12 6	" "
16×8 " "	6 12 6	" "
20×10 best Eureka unfading green...	15 17 6	" "
20×12 " " ...	18 7 6	" "
18×10 best Eureka unfading green ..	13 5 0	" "
16×8 " " ...	10 5 0	" "
20×10 permanent green	11 12 6	" "
18×10 " "	9 12 6	" "
16×8 " "	6 12 6	" "

TILES.

	s. d.	
Best plain red roofing tiles...	42 0	per 1000 at rly. depôt.
Hip and Valley tiles ...	3 7	per doz. "
Best Broseley tiles	50 0	per 1000 "
Do. Ornamental tiles	52 6	" "
Hip and Valley tiles ...	4 0	per doz. "
Best Ruabon red, brown, or brindled do. (Edwards) ...	57 6	" "
Do. Ornamental do.	60 0	" "
Hip tiles	4 0	per doz. "
Valley tiles	3 0	" "
Best Red or Mottled Staffordshire do. (Peakes)	51 9	per 1000 "
Do. Ornamental do.	54 6	" "
Hip tiles	4 1	per doz. "
Valley tiles	3 8	" "
Best "Rosemary" brand plain tiles	48 0	per 1000 "
Best Ornamental tiles	50 0	" "
Hip tiles	4 0	per doz. "
Valley tiles.....	3 8	" "
Best "Hartahill" brand plain tiles, sand-faced	50 0	per 1000 "
Do pressed	47 6	" "
Do. Ornamental do.	50 0	" "
Hip tiles	4 0	per doz. "
Valley tiles	3 6	" "

WOOD.

BUILDING WOOD.	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	13 10 0	... 15 0 0
Deals: best 3 by 9	13 0 0	... 14 0 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 0 0	... 12 0 0
Battens: best 2½ by 6 and 3 by 6...	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best.
Battens: seconds.....	0 10 0	" "
2 in. by 4 in. and 2 in. by 6 in....	9 0 0	... 10 0 0
2 in. by 4½ in. and 2 in. by 5 in...	8 10 0	... 9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
	At per load of 50 ft.	
Fir timber: best middling Dantzig or Memel (average specification)	4 10 0	... 5 0 0
Seconds	4 0 0	... 4 10 0
Small timber (8 in. to 10 in.) ...	3 12 6	... 3 15 0
Small timber (6 in. to 8 in.)	3 0 0	... 3 10 0
Swedish balks	2 10 0	... 3 0 0
Pitch-pine timber (30 ft. average)	4 0 0	... 4 15 0

JOINERS' WOOD.	At per standard.	
White Sea: first yellow deals, 3 in. by 11 in.	24 0 0	... 25 0 0
3 in. by 9 in.	22 0 0	.. 23 0 0
Battens, 2½ in. and 3 in. by 7 in.	16 10 0	... 18 0 0
Second yellow deals, 3 in. by 1 in.	18 10 0	... 20 0 0
" " 3 in. by 9 in.	17 10 0	... 19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	... 14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	13 10 0	... 15 0 0
Battens, 2½ in. and 3 in. by 7 in.	11 0 0	... 12 0 0
Petersburg first yellow deals, 3 in. by 11 in.	21 0 0	... 22 10 0
Do. 3 in. by 9 in.....	18 0 0	... 19 10 0
Battens.....	13 10 0	... 15 0 0
Second yellow deals, 3in. by 11in.	16 0 0	... 17 0 0
Do. 3 in. by 9 in.	14 10 0	... 16 0 0
Battens.....	11 0 0	... 12 10 0
Third yellow deals, 3 in. by 11 in.	13 0 0	... 14 0 0
Do. 3 in. by 9 in.....	12 10 0	... 14 0 0
Battens	10 0 0	... 11 0 0
White Sea and Petersburg—		
First white deals, 3 in. by 11 in.	14 10 0	... 15 10 0
" " 3 in. by 9 in.	13 10 0	... 14 10 0
Battens.....	11 0 0	... 12 0 0
Second white deals, 3 in. by 11 in.	13 10 0	... 14 10 0
" " 3 in. by 9 in.	12 10 0	... 13 10 0
" " battens	10 0 0	... 11 [illegible]
Pitch-pine: deals.....	18 0 0	... 21 0 0
Under 2 in. thick extra	0 10 0	... 1 0 0
Yellow Pine—First, regular sizes	44 0 0	upwards.
Oddments	32 0 0	"
Seconds, regular sizes	33 0 0	"
Yellow Pine oddments	28 0 0	"
Kauri Pine—Planks, per ft. cube..	0 3 6	... 0 5 0

WOOD (*continued*).

JOINERS' WOOD (*continued*)—	At per standard. £ s. d.		£ s. d.
Dantzig and Stettin Oak Logs—			
Large, per ft. cube	0 3 0	...	0 3 6
Small " "	0 2 6	...	0 2 9
Wainscot Oak Logs, per ft. cube..	0 5 6	...	0 6 0
Dry Wainscot Oak, per ft. sup. as inch...	0 0 8½	...	0 0 9½
¾ in. do. do	0 0 7	...	—
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch ...	0 0 9	...	0 1 0
Selected, Figury, per ft. super. as inch	0 1 6	...	0 2 6
Dry Walnut, American, per ft. super. as inch	0 0 10	...	0 1 0
Teak, per load	17 0 0	...	22 0 0
American Whitewood Planks, per ft. cube	0 4 0	...	0 5 0
Prepared Flooring, etc.—	Per square.		
1 in. by 7 in. yellow, planed and shot	0 13 6	...	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	...	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	...	1 0 0
1 in. by 7 in. white, planed and shot	0 12 0	...	0 14 6
1 in. by 7 in. white, planed and matched	0 12 6	...	0 15 0
1¼ in. by 7 in. white, planed and matched	0 15 0	...	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0 11 0	...	0 13 6
1 in. by 7 in. " "	0 14 0	...	0 18 0
¾ in. by 7 in. white " "	0 10 0	...	0 11 6
1 in. by 7 in. " "	0 12 9	...	0 15 0

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.		£ s. d.
Rolled Steel Joists, ordinary sections	7 0 0	...	7 10 0
Compound Girders, ordinary sections	9 0 0	...	10 0 0
Steel Compound Stanchions	12 0 0	...	13 0 0
Angles, Tees, and Channels, ordinary sections	9 0 0	...	10 0 0
Fitch Plates	9 0 0	...	10 0 0
Cast Iron Columns and Stanchions including ordinary patterns	7 10 0	...	8 10 0

METALS.

	Per ton, in London. £ s. d.		£ s. d.
IRON—			
Common Bars	8 0 0	...	8 10 0
Staffordshire Crown Bars, good merchant quality	8 10 0	...	9 0 0
Staffordshire "Marked Bars"...	10 10 0	...	—
Mild Steel Bars	8 15 0	...	9 0 0
Hoop Iron, basis price	9 5 0	...	9 10 0
" " Galvanised	17 0 0	...	—
("And upwards, according to size and gauge.)			
Sheet Iron Black—			
Ordinary sizes to 20 g.	9 10 0	...	—
" " 24 g.	10 10 0	...	—
" " 26 g.	12 0 0	...	—
Sheet Iron, Galvanised, flat, ordinary quality—			
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	14 0 0	...	—
Ordinary sizes to 22 g. and 24 g.	14 10 0	...	—
" " 26 g.	15 0 0	...	—
Sheet Iron, Galvanised, flat, best quality—			
Ordinary sizes to 20 g.	17 0 0	...	—
" " 22 g. and 24 g.	17 10 0	...	—
" " 26 g.	19 0 0	...	—
Galvanised Corrugated Sheets—			
Ordinary sizes 6 ft. to 8 ft. 20 g.	14 0 0	...	—
" " 22 g. and 24 g.	14 10 0	...	—
" " 26 g.	15 15 0	...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 10 0	...	—
Best Soft Steel Sheets, 22 g. & 24 g.	12 10 0	...	—
" " " 26 g.	14 15 0	...	—
Cut Nails, 3 in. to 6 in.	9 10 0	...	9 15 0

(Under 3 in., usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.		£ s. d.
LEAD—Sheet, English, 3lb. and up.	21 0 0	...	—
Pipe in coils	21 10 0	...	—
Soil pipe	24 0 0	...	—
Compo pipe	24 0 0	...	—
ZINC—Sheet—			
Vieille Montagne ton	33 15 0	...	—
Silesian	33 10 0	...	—
COPPER—			
Strong Sheet per lb.	0 1 1	...	—
Thin " "	0 1 2	...	—
Copper nails "	0 1 0	...	—
BRASS—			
Strong Sheet "	0 1 0	...	—
Thin " "	0 1 1	...	—
TIN—English Ingots "	0 1 10	...	—
SOLDER—Plumbers' "	0 0 8½	...	—
Tinmen's "	0 0 10½	...	—
Blowpipe "	0 0 11½	...	—

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1¾d. " "
21 oz. thirds	3¼d. " "
" fourths	2½d. " "
26 oz. thirds	4¼d. " "
" fourths	3¼d. " "
32 oz. thirds	5d. " "
" fourths	4¼d. " "
Flated Sheet, 15 oz.	3¼d. " "
" 21 oz.	4¼d. " "

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

Hartley's	2¼d. per ft. delivered
"	2¾d. " "
"	3¼d. " "
Figured and Oxford Rolled	
"Oceanic" Glass, white	4d. " "
Do. " tinted	5¼d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 1 9
" " " in barrels	"	0 1 10
" " " in drums	"	0 2 0
Boiled " in pipes	"	0 1 11
" " " in barrels	"	0 2 0
" " " in drums	"	0 2 2
Turpentine in barrels	"	0 3 10
" in drums	"	0 4 0
Genuine Ground English White Lead	per ton	23 10 0
Red Lead, Dry	"	22 10 0
Best Linseed Oil Putty	per cwt.	0 7 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

Nat. Tel., 6113 Gerrard. Telegrams, "The Builder, London."

THE INDEX (with TITLE-PAGE) for VOLUME XC. (January to June, 1906) was given as a supplement with the issue for July 14.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

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. Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine Street, W.C.

Advertisements for the current week's issue are received up to HALF-PAST ONE p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST TWELVE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE NOON on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, etc., left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

ADVERTISERS in "THE BUILDER" may have *Replies addressed to the Office*, Catherine Street, Covent Garden, W.C., *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

N.B.—The Reply Boxes are not intended for trade lists, circulars, and the like; should these be received, they cannot (if noticed) be forwarded.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ALTWEN.—For erection of two shops, for Pontardawe Co-operative Society, Ltd. Mr. C. S. Thomas, architect, Herbert-street, Pontardawe:—

Bennett Bros.	£1,100 0 0	W. J. Griffiths	£899 16 3
T. D. Jones ..	1,000 0 0	Rees Morgan	810 0 0
Thomas & Jones	975 0 0	E. Evans, Pontardawe*	777 0 0
Thomas Bros.	939 0 0		

BOAT OF GARTEN.—For the mason, carpenter, slater, plaster, plumber, painter and glazier works of villa, to be built at Boat of Garten, for Mr. James Fraser, Nethybridge. Mr. J. A. Smith, architect, Glenurquhart-road, Inverness. Quantities by Mr. C. A. Hendry, Union-street, Inverness:—

J. Robertson, South-street, Forres.. £816 11 10

BRENTWOOD (Essex).—For fitting up spray baths, etc., at High Wood School, for the Metropolitan Asylums Board. Mr. W. T. Hatch, Engineer-in-Chief:—

Dent & Hellyer ..	£345 0	E. Tabor	£199 18
North British Plumbing Co., Ltd.	218 2	W. Dennison	155 4
A. H. Inns	215 0	W. J. Snuggs, Victoria House, Aldershot*	149 10

CHARTHAM HATCH.—For the enlargement of the Council school, for the Kent Education Committee. Mr. W. H. Robson, surveyor, 44, Bedford-row, W.C.:—

Gann & Co., Ltd.	£675	W. J. Brewster	£550
T. H. Denne	599	C. Mount	533
C. Jordan	578	J. Browning, Canterbury*	531
W. J. Adcock	569		
Sturry Building Co., Ltd.	557		

CHESHAM.—For private street works in Stanley-avenue, for the Urban District Council. Mr. P. C. Dormer, Surveyor and Waterworks Engineer, Council offices, Chesham:—

W. Y. Green & Co.	£567 0	L. Gibbons	£432 15
J. Jackson	507 0	A. F. Lee	419 0
F. Fowles	485 0	T. Free & Sons, Maidenhead*	413 3
A. Mead & Son ..	450 0		

COWDENBEATH.—For additional drainage works, for the Town Council. Messrs. Buchan & Bennett, C.E., 12, Hill-street, Edinburgh:—

J. Martin	£770 1 4	D. Adamson, Cowdenbeath*	£758 12 11

CROYDON.—For erecting a school for 1,200 children, Davidson-road, for the Education Committee. Mr. H. Carter Pegg, F.R.I.B.A., architect, Thornton Heath. Quantities by Mr. Mansfield Price, Salatin, Sutton, Surrey:—

J. Appleby & Sons, Cornwall Works, Lambeth, S.E.* £15,900

DARRANLAS.—For the erection of mixed school to accommodate 400 children, for Mountain Ash Urban District Council Education Committee. Mr. W. H. Williams, architect, Town Hall, Mountain Ash:—

E. Thomas & Sons	£6,679 0 0	A. R. John..	£5,443 5 8
Jones Bros...	5,930 8 0	Knox & Wells	5,423 0 0
G. Harris ..	5,877 18 0	Williams Bros.	5,404 11 6
J. Davies & Co.	5,823 0 0	C. Leather & Sons	5,374 0 0
Hughes & Stirling ..	5,675 0 0	A. Richards	5,355 10 8
C. Jenkins & Sons	5,545 0 0	Jones Bros...	4,992 17 5
J. H. James	5,520 0 0	T. W. Davies, Mountain Ash*	4,990 5 0
		A. J. Colborne	4,927 14 10

GWAUN-CAE-GURWEN.—For the erection of a new Calvinistic Methodist Chapel. Mr. A. S. Williams, architect, Llandilo. Quantities by the architect:—

Morgan Bros. ..	£2,775 16	Thomas Bros. ..	£2,589 10
J. D. Howells ..	2,756 10	T. Edwards	2,450 0
W. D. Morgan ..	2,670 0	J. Williams	2,425 0

HAVERFORDWEST.—For enlarging and reconstructing Lawrenny non-provided school. Mr. H. J. P. Thomas, architect and surveyor, 9, Victoria-place, Haverfordwest:—

Rees Phillips	£275 10	Thomas & Williams	£215 0
Jones & Williams	250 10	L. Davies, Neyland*	194 10

HENDON.—For wood and corrugated iron shelter in the Hendon public park, N.W., for the Urban District Council:—

Marchant & Hirst	£296 0 0	T. J. Hawkins & Co.	£174 0 0
R. Isles & Co. ..	257 0 0	J. Harrison & Co.	169 0 0
H. Parfect	227 0 0	Turpie Bros.	156 0 0
J. J. Quarterman	225 0 0	F. King, Hendon, N.W.*	154 4 3
J. McManus	223 0 0	W. Harbrow	153 0 0
F. Smith & Co. ..	199 0 0		
Wire Wove Roofing Co.	189 0 0		

HEREFORD.—Alterations and additions to Marbury House, S. Owen-street, Hereford, for Mr. A. Thomason. Messrs. Groome & Bettington, architects and surveyors, King-street, Hereford:—

W. Preece	£299 10	E. W. Wilks	£247 10
C. Cooke	268 0	T. Biles	246 10
R. L. Friend	265 0	J. T. Jones	210 0
W. Rowbery	250 0	W. C. Bolt*	160 0

KEIGHLEY.—For erecting a spinning-mill, shed, engine and boiler houses, chimney, etc., South-street. Messrs. J. B. Bailey & Son, architects, 3, Scott-street, Keighley:—

Masons and Joiners: Bird Bros. & Co.
Iron and Steel: Clapham Bros., Ltd.
Slater: W. Thornton.
Plasterer and Concreter: Wilson.
Plumber and Glazier: J. Harrison.
Painter: J. A. Mullen.
[All of Keighley.]

KENDAL.—For building an infants' Sunday school in Highgate, for the trustees of Zion chapel. Mr. J. Hutton, architect, Kendal. Quantities by architect:—

Mason and Slater: R. & W. Dixon, Waller, Fellside, Kendal	£367 0
Joiner: N. Benson, Kendal	318 10
Plumbers and Hot-water Apparatus: T. & W. G. Garnett, New-road, Kendal	210 0
Painter and Glazier: J. Wells, Collin Croft, Kendal	31 0
Plasterers: Woodburn & Storey, Kendal	72 0

LLANDILO.—For constructing a cattle market and auction mart adjoining the Llandilo Bridge Station, for Llandilo and District Cattle Market and Auction Mart Co., Ltd. Mr. A. S. Williams, architect and surveyor, Llandilo. Quantities by the architect:—

G. Mercer	£2,480 0 0	W. D. Morgan, Gamant* ..	£1,870 0 0
Jenkins	2,253 4 0	Davies & Griffiths	1,851 0 0
F. C. Williams	1,996 5 6		
Morgan Morgan & Son	1,970 0 0		

[Iron work not included in the above amounts.]

BRIGHTON.—For the supply of dressed granite kerb and channel. Mr. A. Weller, Borough Surveyor:—

Name and Address.	Description of Granite.	12 in. × 6 in. Granite Flat Kerb.	12 in. × 6 in. Granite Flat Channel.	12 in. × 6 in. Granite Edge Kerb.
Brookes, Ltd., Westminster*	Norway	1—2½	1—1½	1—1½
P. Goodchild & Co.	Norway	1—2½	1—2½	1—2
A. & F. Manuelle	Norway	1—2½	1—2½	1—2
E. Jarrett	Norway	1—2½	1—2½	1—2½
Blickfeldt & Co.	Norway	1—2½	1—2½	1—2½
J. R. White & Co.	Norway	1—3½	1—2½	1—2½
W. Griffiths & Co., Ltd.	Norway	1—3½	1—2½	1—3
J. Freeman, Sons, & Co., Ltd.	Cornwall	1—3½	1—1½	1—3½
S. Pitt	Cornwall	1—5	1—3	1—4
Hard Stone Firms, Ltd.	Cornwall	1—5½	1—4½	1—4
Duke & Co., Ltd.	Devon	1—4	1—2	1—2
Tilbury Contracting & Dredging Co., Ltd.	Scotch	1—10	1—10	1—9
W. Arnold & Son	Gloucester	1—1½	1—1½	1—0½
G. A. Watson & Co., Ltd.	Irish	1—4	1—3	1—3
N. L. Tostevin	Jersey	1—8	1—6	1—6
N. L. Tostevin	Jersey	2—9	2—2	2—2
P. Falla	Guernsey	—	—	1—0½

LONDON.—For the erection of a Mission Church and hall on site of Nos. 109, 111, 113, and 115, Albert-road, Peckham, S.E., for the Vicar of St. Mary Magdalene, Peckham. Mr. G. A. Lansdown, architect, 9, Regent-street, S.W.:—

F. J. Gorham	£4,091	J. Burgess & Sons	£3,548
Lascelles & Co., Ltd.	3,875	R. & E. Evans	3,479
J. Marsland & Sons	3,713	T. G. Sharpington	3,468
Johnson & Co.	3,673	F. & H. F. Higgs	3,434
Higgs & Hill, Ltd.	3,642	C. Ansell	3,333
H. & E. Lea	3,590	W. Nash	3,287
Kirk & Kirk	3,589	H. L. Holloway*	3,180
G. Parker	3,549		

LONDON.—For the erection of the German Sailors' Home, West India Dock-road, E. Mr. G. Waymouth, architect, Raymond House, 32 and 34, Theobalds-road, Gray's Inn, W.C.:—

Richardson Bros.	£8,995	G. Trollope & Sons and Colls & Sons, Ltd.	£7,500
Staines	7,847		
J. Hunt & Sons	7,815		
G. Barker	7,675	Dove Bros.	7,275

[Exclusive of foundations.]

PAIGNTON.—For erecting a house. Mr. J. A. Lucas, architect, Exeter:—

White, Chatton, & Co.	£1,247 12	M. Bridgman	£1,075 0
W. Smaridge	1,223 0	H. Drew	1,075 0
W. Buchnell	1,184 0	H. Marshall	1,020 0
G. Webber	1,150 0	Collings	1,004 12
E. Westlake	1,150 0	Yeo & Sons	992 0
N. Harris	1,150 0	Narracott, Stoke Gabriel*	964 0
H. C. Goss	1,150 0		

REIGATE.—For the construction of sewers in Station-road, Rees's-road, High-street, Brighton-road footpath, etc., for the Town Council. Mr. F. T. Clayton, C.E., Borough Engineer and Surveyor:—

S. Kavanagh & Co.	£1,857 0 3	Poller Bros.	£1,454 4 2
T. Watson, Jun.	1,744 7 0	James & Co.	1,446 0 0
S. Atkins & Co.	1,500 14 11	W. Minehead & Co.	1,419 0 0
E. H. King	1,582 13 9	G. G. Rayner	1,415 6 6
C. Castle & Co.	1,575 11 7	E. T. Jeffery	1,403 3 0
Ripley, Strong, & Co.	1,574 18 3	H. Young	1,399 13 6
K. & E. Iles	1,552 15 7	J. May	1,389 0 0
Fry Bros.	1,537 14 3	S. Redhouse, Stotfold, Baldock‡	1,352 2 9
T. Free & Sons	1,475 3 6	T. Turner, Blackwater‡	1,309 14 11
G. S. Faulkner	1,460 1 8		

‡ Accepted in parts.

REIGATE.—For the erection of cartsheds and a store at the Corporation Depôts in Brighton-road, Redhill, London-road, and Blackborough-road, Reigate, for the Town Council. Mr. F. T. Clayton, Borough Surveyor, Reigate:—

J. Childs	£456 0 0	C. Nightingale & Sons	£241 10 0
R. Bristow	447 9 0	G. Cummins & Sons, Ltd.	240 0 0
J. Harrison & Co.	288 0 0	A. B. Wiles	230 0 0
Marriott & Co.	260 14 0	J. Hodge & Son, Reigate*	225 0 0
Bushby & Son	256 0 0		
E. T. Jeffery	250 15 6		

SHEFFIELD.—For painting, whitewashing, etc., inside blocks Nos. 1, 2, and 3, at the hospital, Fir Vale, for the Guardians:—
Mountford Bros., Normanton-road, Derby £107 4

UPLEADEN.—For the first portion of the restoration of the parish church. Messrs. Lingen, Barker, Son, & Ellis, architects, 3, Unity-street, Bristol:—

H. Frith	£266 14 10	Y. Hall	£206 9 4
W. Jones	257 0 0	M. A. Wood & Sons	197 6 9
A. King & Son	252 0 0	J. Simmonds, Gloucester*	195 10 9
D. Smith	237 13 3	R. S. Friend	194 5 0
H. Lewis	229 17 0	C. Tanner	170 5 6
W. F. Drew	224 1 7		
H. Smith	217 13 10		
Wall & Hook	214 0 3		

WALTHAMSTOW.—For heating apparatus at the Winns-avenue schools, for the Education Committee. Mr. H. Prosser, architect:—

Russell & Co.	£1,030 0	W. J. Fox	£971 0
Musgrave & Co.	1,021 0	Wontner Smith, Gray, & Co.	930 17
Palowkar & Sons	1,020 0	W. Cassidy	924 0
Rosser & Russell	1,020 0	Boyd & Sons	913 0
J. Grundy	997 0		
Price, Lea, & Co.	996 0		

WIMBLEDON.—For the erection of a house in Murray-road, for Mrs. Lord. Mr. G. A. Lansdown, architect, 9, Regent-street, S.W.:—
J. Burgess & Sons* £1,590

W. H. Lascelles & Co.

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